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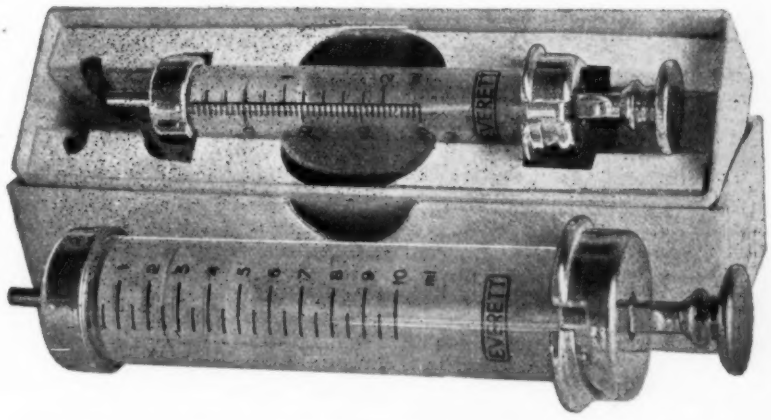

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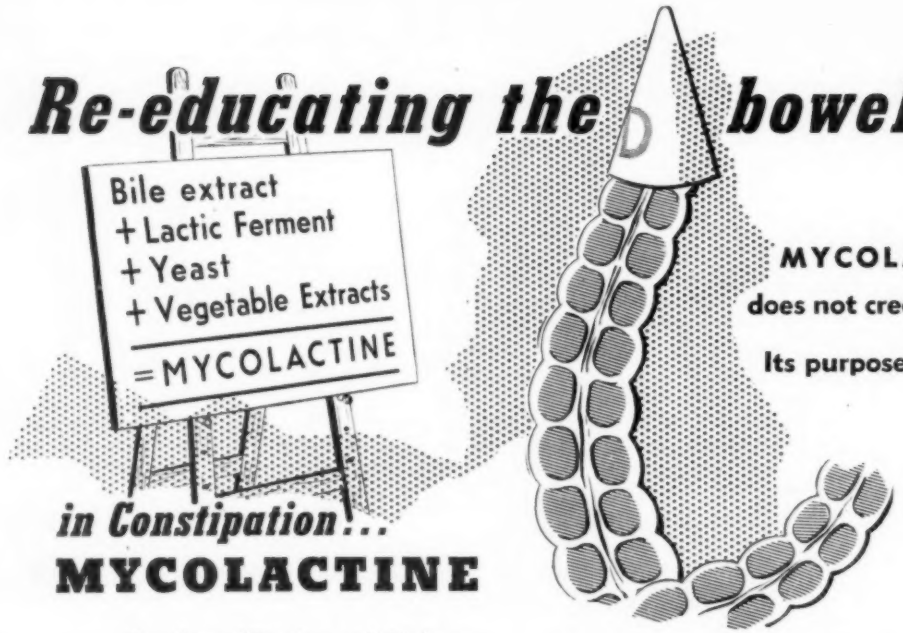

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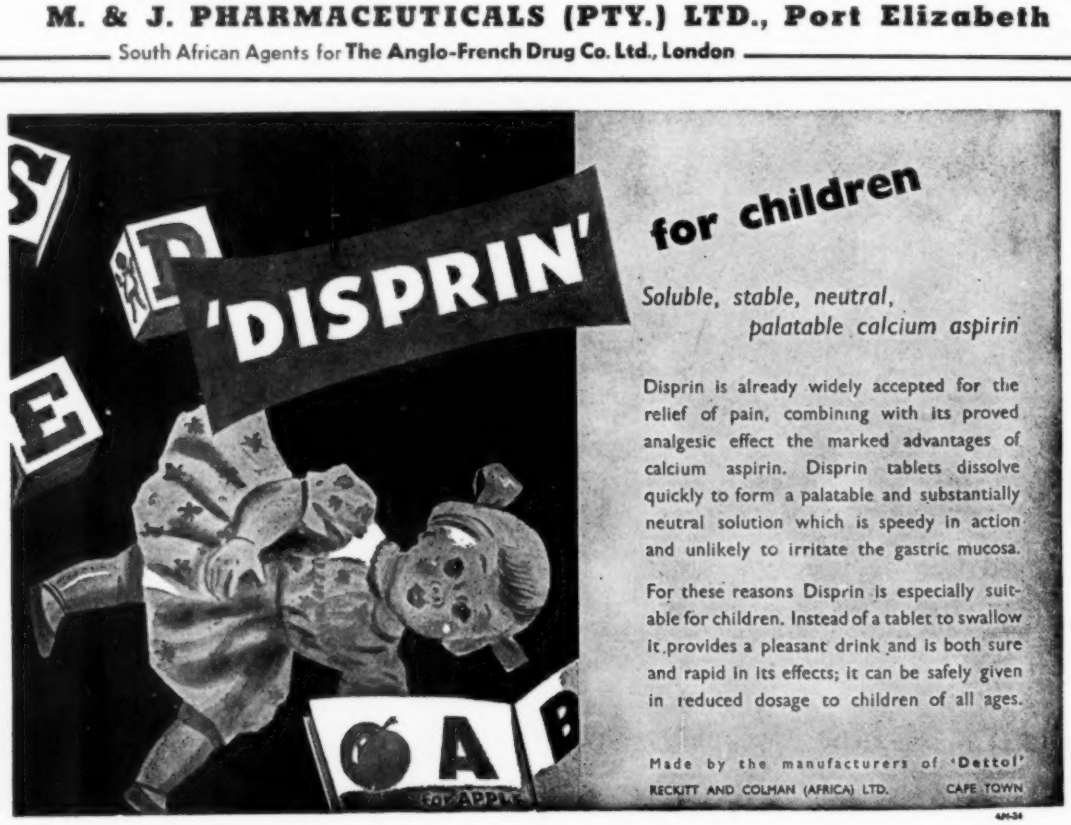
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THE NATURE OF ANGINAL PAIN*

J. KELMAN DRUMMOND, M.B., CH.B., M.R.C.P. (EDIN.)
Durban

The pain of angina pectoris is considered to be the result of myocardial ischaemia, and to result from the stimulation of nerve endings in muscle by metabolites.

There are, however, certain clinical and experimental findings which appear to suggest that the pain may be a vascular one related to coronary spasm.

Beck[1] has recently brilliantly demonstrated that a shift of the S-T segment is due to electrical imbalance of the heart, resulting from the fact that one area of the heart is anoxic relative to the remainder of the heart. Such a deviation of the cardiac vector must be due to myocardial involvement, the anoxia deflecting the vector from its normal course.

Does such an S-T shift necessarily produce pain? We are familiar with the ischaemic heart, where a permanently depressed S-T segment is often not associated with pain. Similarly prolonged paroxysmal tachycardia or anaemia may produce such changes yet not necessarily be associated with pain.

In view of this I performed exercise tests on two elderly subjects who did not complain of chest pain and was able to produce a depressed S-T segment without pain.

When one considers the high incidence of symptomless coronary atheroma found in individuals dying of other causes, it becomes obvious that, given sufficient exercise, it must be easy to produce an S-T depression.

Paul Wood[2] states that 'very few (less than 10%) electrocardiograms remain normal during or immediately after an attack of true angina *or sufficient effort to induce breathlessness and fatigue (in ischaemic subjects)*'.

It would therefore appear to be a reasonable conclusion that relative anoxia producing regional myocardial ischaemia is not necessarily associated with pain.

We are familiar with the fact that an exercise test in individuals with the classical anginal syndrome may be negative in a significant proportion of cases.

Gerlis[3] has recently demonstrated the presence of adventitial infiltrations round the vasa vasorum of coronary arteries which he considers to be the result of vascular spasm causing ischaemia, and concludes that coronary spasm, rather than anatomical change, is responsible for the clinical symptoms of coronary insufficiency, particularly as vaso-dilators relieve the pain.

It has been suggested that the peripheral vasodilation induced by trinitrin may reduce the work of the heart (by reducing right auricular pressure) and thus relieve the strain on ischaemic muscle.

However, Paul Wood[4] records the 'paradoxical' relief of anginal pain where the S-T segment has actually been further depressed by a vaso-dilator, while pain has been relieved.

Since individuals suffering from angina are almost always on the ascending limb of the Starling curve it is highly possible that coronary blood flow to an ischaemic area may actually be reduced by the peripheral pooling of the blood. A reasonable assumption, it would seem, is that coronary spasm is relieved and that this is more important than the amount of oxygen delivered to the muscle.

Vascular spasm is known to cause pain.

The myocardium of a normal individual is insensitive to stimulation.[5]

Gerlis found his changes around the larger coronary arteries only, and not round the smaller myocardial branches, and points out that Woollard has demonstrated that the former are mainly supplied by sympathetic fibres and the latter by the vagus.

The precise mode of action of the autonomic nervous system on the coronary arteries is debatable, but Green[6] has shown that profound stimuli from many parts of the body can cause profound vaso-constriction of the coronary arteries.

* A paper read at the first clinical meeting of the Natal branch of the South African Cardiac Society.

Exercise and emotional stress induce sympathetic stimulation and vagal inhibition, and resting reverses this process.

If electrical imbalance *per se* were the cause of pain it should appear in a higher percentage of exercise tests. The fact that it does not appear would depend on whether collateral circulation to the involved muscle was sufficient to prevent regional ischaemia or whether, particularly with a rigid artery, the pain was due to spasm of more plastic vasa vasorum.

It is obvious that anatomical coronary change and myocardial ischaemia must be closely associated, but if anginal pain was functional, and vascular or perivascular in origin, it would be possible to have spasm without regional anoxia of muscle.

If this hypothesis were accepted it would cast serious doubts on the value of the exercise test, for a positive test could represent the effects of anatomical change rather than a vascular spasm. One has long felt, particularly where pain has not been quite typical, that the mere depression of an S-T segment is not proof of the existence of the syndrome of angina pectoris.

Beecher[7] has relieved anginal pain in over 30% of cases by the administration of a placebo, and Russek[8] refuses to acknowledge the mere relief of pain as proof of the efficacy of a drug tested for angina.

Since the coronary vessels are under autonomic control, and thence under cortico-hypothalamic control, it is possible that the supposedly inert placebo may effect changes in the autonomic balance which would tend to influence favourably the effects of exertion or emotion on the coronary circulation.

The person who suffers from angina is commonly a tense, anxious and frightened individual, who by his reactions to his symptoms may well condition the balance of his autonomic nervous system in the direction of a more easily induced vascular spasm.

Russek[8] has condemned alleged remedies for angina because they have not favourably influenced S-T depression, but such remedies may simply be less potent than trinitrin or Peritrate yet may sufficiently relax a contracted coronary artery to relieve pain.

A concept of vasospasm would allow of a diagnosis of reflex vasospasm from, say, gall-bladder or diaphragmatic hernia which, one feels, we all see from time to time as an alarming event.

The recent demonstration by Brewster *et al.*[9] that the ultimate effects of the thyroid hormone involve an increased adrenaline output would then account for some relief of anginal pain by total thyroidectomy.

Raab and Gigee[10] have shown that in diseased hearts, including those due to coronary sclerosis, there is an alteration in the normal concentration of noradrenaline and adrenaline with an increased concentration of the latter in these hearts.

Noradrenaline has a fairly generalized vaso-constrictor effect on blood vessels (*except on the coronaries, which it dilates*).[11] Adrenaline is not considered a potent vaso-constrictor, merely having a transient and slight initial effect on the diastolic pressure, but when one seeks some enlightenment on the control of the calibre of the coronary vessels one finds hypotheses, many in direct conflict with one another, from which it is easy to pick one to suit one's own opinion. Suffice to say that a hormonal and autonomic imbalance, in the presence of anatomical change, may create conditions favouring vascular spasm.

As regards pain in myocardial infarction, with or without thrombosis, it is obvious that slow tissue-death is involved, and this alone may produce pain, but it seems more reasonable to postulate that coronary spasm of an irreversible nature is present in both cases as an accompanying factor, than to state that relative anoxia beyond a simple anatomical narrowing is sufficient to produce so devastating an effect.

CONCLUSIONS

Coronary atheroma is a common condition and is often symptomless.

Clinically it is commonly detected with the electrocardiogram when it produces an electrical imbalance of the heart.

Such an imbalance may be associated with the anginal pain but is often painless. On the other hand anginal pain may occur without demonstrable electrical imbalance.

Anatomical coronary changes can produce painless myocardial ischaemia, and functional vascular spasm could produce pain without myocardial ischaemia.

Undoubtedly a combination of the two factors is the most commonly encountered disturbance, but it is tentatively suggested that vascular spasm rather than myocardial ischaemia is the factor which decides whether pain is present or absent.

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UNION DEPARTMENT OF HEALTH BULLETIN

Union Department of Health Bulletin. Report for the 7 days ended 19 July 1956.

Plague, Smallpox, Typhus Fever: Nil.

Epidemic Diseases in Other Countries.

Plague: Nil.

Cholera in Calcutta (India); Chalna, Chittagong, Dacca (Pakistan).

Smallpox in Kandahar (Afghanistan); Ahmedabad, Allahabad, Bombay, Calcutta, Cuddalore, Delhi, Kanpur, Lucknow, Madras, Pondicherry, Visakhapatnam (India); Dacca (Pakistan); Mogadiscio (Somalia).

Typhus Fever: Nil.

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VAN DIE REDAKSIE

STOLLINGSTEENSTOWWE IN DIE BLOEDSOMLOOP

By pasiënte wat aan bloedingssiektes ly ontbreek daar moontlik in die bloed 'n faktor wat noodsaaklik is vir doeltreffende stolling. Ons kan dadelik aan voorbeelde hiervan dink. Daar is byvoorbeeld die afwesigheid van bloedplaatjies by siektes waarby hierdie plaatjies drasties verminder word, die gebrek aan bloedingbestrydende globulien by hemofilie, en die gebrek aan faktor 5 of faktor 7 hetsy as aangebore afwyking, hetsy as later ontstaande defek. Baie ander voorbeelde kan aangehaal word. In die meeste gevalle kan die stollingsabnormaliteit reggestel word deur die toevoeging van klein hoeveelhede normale bloed tot hierdie soort abnormale bloed, of selfs deur die toevoeging van een abnormale bloedsoort tot 'n ander soort abnormale bloed. Laasgenoemde geval word beskou as 'n wederkerige vergoeding vir gebreke, want elkeen van die abnormale bloedsoorte bevat betreklik baie van die faktor wat by die ander ontbreek.

By sekere siektes bestaan hierdie toestand nie. Die pasiënt kan 'n stollingsdefek en 'n kwaai bloedingssiekte hê. Maar nie alleen word die bloed slegs onvolkome gekorrigeer deur die toevoeging van normale bloed nie, maar die normale bloed word boonop abnormaal gemaak. Hierdie omstandighede dui gewoonlik op die aanwesigheid van 'n stollingsteenstof in die bloedsomloop. 'n Vergelykbare toestand sou bestaan as 'n stollingsremmende stof soos heparien *in vitro* bygevoeg word. In seldsame gevalle kan heparien-agtige werksaamheid selfs aangetoon word by natuurlik voorkomende siektes,[1, 2] of dit kan voorkom ná die gebruik van stikstofmosterd of ioniserende bestralings.[3] Maar die stollingsteenstof is in die meeste gevalle nie heparien, of selfs heparien-agtig, nie.

Daar is drie groepe siektetoestande wat verantwoordelik is vir die meeste gevalle waar stollingsteenstowwe in die bloed voorkom:[3–6] (*a*) kompliserende kondisies by hemofilie en christmas-siekte; (*b*) kondisies na swangerskap; (*c*) 'n verskeidenheid slepende siektes.

Voorbeelde van hierdie komplikasie by hemofilie en christmas-siekte word vandag meer dikwels as in die verlede uitgeken. Dit is ongetwyfeld deels te danke aan beter diagnose, en waarskynlik ook deels aan die groter gebruik van bloed- of bloedplasma-oortappings. Daar is reeds aanspraak gemaak daarop,[7] en dit is moontlik bevestig,[8] dat natuurlik voorkomende hemofilie geheel en al òf gedeeltelik te wyte is aan 'n oormaat van 'n stof wat 'n stollingsremmende werking het. Maar baie

EDITORIAL

CIRCULATING ANTICOAGULANTS

Patients suffering from bleeding diseases may lack a factor in their blood which is necessary for adequate coagulation. Examples of this readily spring to mind. One may mention the absence of blood platelets in thrombocytopenic states, the deficiency of anti-haemophilic globulin in haemophilia, and the lack of factor 5 or factor 7 either as a congenital anomaly or an acquired defect. Many more examples could be quoted. The coagulation defect can, in most cases, be corrected by the addition of small proportions of normal blood to this kind of abnormal blood, or even by the addition of one abnormal blood to a different variety of abnormal blood. The latter instance is regarded as a mutual correction of defects, since each of the abnormal bloods contains a relative abundance of the factor which is lacking in the other.

In certain diseases this state of affairs does not exist. The patient may have a coagulation defect and a severe haemorrhagic state. Yet not only is the blood not fully corrected by the addition of normal blood but the normal blood is rendered abnormal. These circumstances usually imply the presence of a circulating anticoagulant. A somewhat comparable state of affairs would exist if an anticoagulant substance such as heparin were added *in vitro*. On rare occasions, heparin-like activity may even be demonstrated in naturally occurring disease[1,2] or may follow the use of nitrogen mustard or ionizing radiations.[3] But in most cases the anticoagulant is not heparin or even heparin-like.

Three groups of conditions account for the bulk of cases in which circulating anticoagulants have been encountered:[3–6] (*a*) conditions complicating haemophilia and christmas disease; (*b*) conditions following pregnancy; and (*c*) a variety of chronic diseases.

Instances of this complication of haemophilia and christmas disease are being encountered more frequently than in the past. This is no doubt due in part to better diagnosis and also probably to the greater use of blood or plasma transfusion in those diseases. It has been claimed,[7] in

sensitiewe toetse is nodig om hierdie stof aan te toon. Die stollingsteenstof in die bloed, wat by hemofilie en by ander siektes ontwikkel, toon klinies en in die laboratorium treffende afwykings. Dit kom slegs nou en dan voor, en is klaarblyklik 'n teenliggaam wat ontstaan as gevolg van die antigeen-prikkeling van die bloedingremmende globulien aanwesig in oorgetapte bloed. Dit verduidelik dan ook sy teenwoordigheid in die gammaglobulien-bestanddeel in die bloed en die feit dat die neerslagtoetse positief was by sommige gerapporteerde gevalle. Dit is proefgewys by konyne opgewek.[9] Gevalle wat gedurende of kort ná swangerskap voorkom is ook moontlik te wyte aan 'n immunologiese meganisme. Daar is selfs 'n verslag oor 'n geval[10] waar die pasiënt gedurende haar eerste en tweede swangerskap 'n stollingsteenstof ontwikkel het, en haar tweede kind het by geboorte 'n soortgelyke afwyking van die stollingsmeganisme getoon. Die stollingsteenstof kon 77 dae lank in die kind se bloed aangetoon word, wat 'n sterk aanduiding was dat die teenliggaampies deur die plasenta uitgewissel is. Stollingsteenstowwe word ook aangetref by pasiënte wat ander tekens van 'n immunologiese steuring toon, soos die aanwesigheid van rooi bloedsel outo- en iso-agglutiniene en 'n positiewe Coombs-toets soos by sommige gevalle van verspreide lupus erythematosus (DLE) en polyarteritis nodosa.[3] Stollingsteenstowwe is tewens glad nie ongewoond by DLE nie,[11] en 'n spesiale kombinasie van stollingsdefekte by hierdie siekte word selfs beskryf.[12] Maar die immunologiese meganisme kan nie op grond van ons huidige kennis geblameer word vir alle gevalle van stollingsremmende stowwe in die bloedsomloop nie, want hierdie stowwe is blykbaar reeds aangetref by oënskynlik gesonde persone en by pasiënte met teringagtige klieraandoenings, vergrote limfknope weens reaktiewe oormatige groei van onbekende oorsake, propvorming in die hartspier, slepende nierontsteking, sifilis en ander siektes.[4]

As die siekte eers vermoed word, is dit nie baie moeilik om die diagnose in die laboratorium te bevestig nie. Die een-stadium protrombien-tyd is gewoonlik normaal omdat die meeste van hierdie stollingsremmende stowwe nie vóórgevormde tromboplastien affekteer nie, maar eerder gedurende die vorming van bloed-tromboplastien inwerk. Die stollingstyd is gewoonlik lank, en mengsels van die pasiënt se volle bloed met normale volle bloed neem langer as gewoonlik om te stol. Dit kan dikwels ook aangetoon word by mengsels van sitraat- of oksalaatplasma's van pasiënte met normale bloedwei wat op dié manier behandel is, maar ook hier kan baie ongerymdhede voorkom. By sommige pasiënte kon die stollingsteenstowwe slegs by plasma waarby kalsium weer toegevoeg is gedemonstreer word en nie by volle bloed nie;[13] die stollingsteenstowwe kan ‚verdwyn' as die bloedwei nie dadelik getoets word nie,[14] of kan slegs bespeur word in plasma wat min bloedplaatjies bevat.[4] Soms kan die stollingsteenstof op kamertemperatuur aangetoon word en nie op liggaamstemperatuur nie.[15]

Dit is soms moontlik om deur middel van die protrombien-verbruikingstoets afwykings te demonstreer wat nie na vore kom wanneer die stollingstye van bloedmengsels getoets word nie.[16] Die tromboplastien-

fact, and possibly confirmed,[8] that naturally occurring haemophilia may in whole or in part be due to excess of an anticoagulant-like substance. But this substance requires very sensitive tests for its demonstration. The circulating anticoagulant which develops in these haemophilic cases and in other patients produces striking clinical and laboratory anomalies. It occurs only in occasional cases and is apparently an antibody resulting from the antigenic stimulus of the anti-haemophilic globulin present in the transfused blood. This explains its presence in the gamma-globulin fraction of blood and the finding of positive precipitin tests in some of the recorded cases. It has been reproduced experimentally in rabbits.[9] Cases occurring during, or shortly after the termination of, pregnancy may also possibly be ascribed to an immunologic mechanism. A case has even been described[10] where a patient developed an anticoagulant during the first and second pregnancy and her second child was born with a similar abnormality of the coagulation mechanism. The anticoagulant was demonstrable in the child's circulation for 77 days, strongly suggesting transplacental transfer of antibodies. Anticoagulants are also found in patients showing other indications of an immunologic disturbance, such as the presence of red-cell auto-agglutinins and iso-agglutinins, and a positive Coombes test, as in some cases of disseminated lupus erythematosus (DLE) and polyarteritis nodosa.[3] In fact circulating anticoagulants are not at all uncommon in DLE[11] and even a special combination of coagulation defects has been described in this condition.[12] But the immunologic mechanism cannot as yet be blamed for all cases with circulating anticoagulants since they have been said to have been encountered in apparently healthy people and in patients with tuberculous lymphadenopathy, enlarged lymph-nodes due to reactive hyperplasia of unknown origin, myocardial infarction, chronic nephritis, syphilis and other diseases.[4]

Once the condition has been suspected it is not very difficult to obtain laboratory confirmation. The one-stage prothrombin time is usually normal since most of these anticoagulants do not affect preformed thromboplastin, but act rather during the elaboration of blood thromboplastin. The coagulation time is commonly prolonged, and mixtures of the patient's whole blood with normal whole blood give coagulation times which are longer than normal. This can often also be shown with mixtures of citrate or oxalate plasma from the patient with normal plasma thus treated, but many anomalies occur. In some patients the anticoagulants were only demonstrable with recalcified plasma and not with whole blood;[13] anticoagulants may 'disappear' if the plasma is not tested immediately[14] or may only be detected in platelet-poor plasma.[4] Sometimes the anticoagulant may be demonstrable at room temperature and not at body temperature.[15] It may be possible to demonstrate abnormalities by means of the pro-

vormings-toets[4] kan moontlik die afwyking aantoon wanneer ander metodes nie daarin slaag nie, maar selfs hierdie toets is nie altyd onfeilbaar nie. Die belangrikste element by die diagnose is 'n sterk vermoede dat die pasiënte aan hierdie siekte ly.

Die behandeling is moeilik. Waar dit tesame met hemofilie voorkom, verbeter die kondisie gewoonlik mettertyd mits bloedoortappings vermy kan word. Soms kan 'n massale oortapping 'n pasiënt deur 'n krisis help, maar dit is moontlik dat die eintlike patologiese toestand vererger sal word. Sommige gevalle wat ná swangerskap voorkom kan baie lank duur (soms tot 13 jaar), terwyl ander binne 'n jaar of twee verbeter. Gevalle wat by 'n algemene siekte voorkom, verg behandeling vir daardie siekte, maar gewoonlik word die bloedingssiekte nie juis daardeur beïnvloed nie. Die adrenokortikotrofiese hormoon (ACTH), kortisoon en prednisoon is almal reeds gebruik, maar die resultate was meestal onbevredigend. Moontlik sal hulle doeltreffender wees by pasiënte wat aan verspreide lupus erythematosus of polyarteritis nodosa ly. Skommelings in die toestand kom egter ook vanself voor, en die verbetering word dan toegeskryf aan die behandeling wat toevallig op daardie tydstip toegepas word. Die meeste wat 'n mens kan verwag is om 'n behandelingsmiddel of metode uit te vind wat die pasiënt aan die lewe sal hou totdat verbetering spontaan intree.

thrombin-consumption test which are not obvious when coagulation times of blood mixtures are tested.[16] The thromboplastin-generation test[4] may demonstrate the abnormality when other methods fail, though even this is not infallible. The most important element in the diagnosis is a high index of suspicion of the existence of the condition.

Treatment is not easy. Cases occurring in haemophilia generally subside in time provided transfusion can be avoided. Occasionally a massive transfusion may carry the patient through a crisis but this might conceivably aggravate the underlying pathological state. Cases following pregnancy may persist for long periods of time (even up to 13 years). Others have improved in a year or two. Cases occurring with systemic disease require treatment for that disease but this has very little effect on the haemorrhagic state in most cases. Adrenocorticotrophic hormone (ACTH), cortisone and prednisone have all been tried, but usually the results are disappointing. They may conceivably be more effective in patients with disseminated lupus erythematosus or polyarteritis nodosa. Spontaneous fluctuations also occur and improvement may be ascribed to whatever therapy is being used at any one time. The best that can usually be hoped for is to find some treatment that will keep the patient alive until a spontaneous remission occurs.

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MEDIESE GRADE AAN DIE UNIVERSITEIT VAN PRETORIA

By die Promosieplegtigheid op 23 Junie 1956 is die volgende grade toegeken:

Sesjarige Baccalaureusgraad in Geneeskunde en Snykunde:

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Kruger, Pieter.
Martin, Jacob Kritzinger.
Novak, Elise Alice Sophie.
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van Wyk, Louis Hendrik.
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Graad van Magister in Geneeskunde:

Jordaan, Leon. Graad met Lof. (Dept. Chirurgie.)
Martin, Johanna Maria. (Dept. Patologie.)
Pretorius, Petrus Jacobus. Graad met Lof. (Dept. Pediatrie.)

Graad van Doktor in Geneeskunde:

Irsigler, Franz Johann. (Dept. Chirurgie.) *Proefskrif:* 'Neurochirurgiese Aspekte van die Apoplektiese Sindroom.' Promotor: Prof. H. J. Besselaar.

FLEXOR TENDON REPAIR IN THE HAND

AN ANALYSIS OF THE MANAGEMENT AND RESULTS IN 41 CASES: WITH SPECIAL REFERENCE TO POLLICIS REPAIR AND THE ACCESSORY SHEATH *

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Industrialization has caused a great increase in the number of injured hands, and has also changed the nature of the injuries. It therefore became important that tendon surgery should develop as a field of its own, and that the principles should be established for the sound reconstruction of so highly specialized and important a functional unit as the hand.

This field of surgery was pioneered by Nicoladoni in 1882, when he reported the first tendon-transplant. It was, however, not until Bunnell's work (1918), that this important aspect of surgical practice was placed on a sound foundation. Many other workers have contributed to our understanding of the anatomy, physiology, pathology, operative treatment and after-care of severed tendons but, despite the progress, the final word has not been said on the subject, and tendon repair is still difficult and unsatisfactory in many cases.

The restoration of function to damaged finger-tendons is one of the most difficult of surgical problems. It is not difficult to appose the ends of divided tendon so that they unite, but it is technically difficult to achieve union without adhesions to surrounding structures—and in a finger, if a tendon does not glide fully within its sheath, function is not regained. It is therefore no wonder that in this field the results of the beginner show a marked discrepancy with that of the experienced surgeon. Unfortunately we never see the results of general surgeons who get the occasional cut tendon and apply the fundamental principles of repair but lack the practical experience or finesse necessary to produce good results. Any surgeon doing a large series of cases over a period of years must develop a specific technique, operative procedure, and follow-up; and where many surgeons operate, with varied experience, and some procedures show consistently good results and others continually bad results, it follows that the method is at fault and not the dexterity of the operator or his technique. In the literature the abundance of new methods and modified techniques is impressive, but assessment of results are less common; and careful follow-ups of the work of individual operators, or of a number of individuals, are relatively rare.

MATERIAL

An analysis is made of 41 flexor-tendon repairs performed by the surgeons and registrars of the Birmingham Accident Hospital from June 1951 to June 1954. Because simple injuries raise sufficient problems for the surgeon, no cases are included in this series that are complicated by extensive loss of skin, multiple involvement of digits, fractures, or extensive destruction of soft tissue. Only those cases that attended a personal follow-up are included. Nevertheless, cases done before or since the 1951-54 period, those that did not attend for assessment, and those in which tendon injuries were complicated by soft-tissue destruction or fractures, were invaluable in confirming the conclusions drawn from the analysed series. The series is small, but Table I gives an indication of the amount of tendon surgery done at the hospital during one year.

In this analysis I found it extremely difficult to obtain all the required data, because so often details were omitted from the operation notes. None of my own cases are included in the series

TABLE I. TENDON SURGERY OF THE HAND AT THE BIRMINGHAM ACCIDENT HOSPITAL DURING 1 YEAR (JUNE 1953—JUNE 1954)

(excluding hand injuries with extensive loss of skin, multiple involvement of digits, fractures, or extensive destruction of soft tissue)

Method of Repair	*No. of Cases*
Main Theatre	
Flexor-tendon grafts to fingers	12
Flexor-tendon grafts to thumb	6
Secondary suture of flexor tendons to fingers	18
Secondary suture of flexor pollicis longus	4
Extensor-tendon repair to fingers	14
Repair, suture or transplant of extensor pollicis longus	11
Trigger finger	8
Exploration of tendon sheath	3
Tendon repairs—notes not traced	5
Casualty Theatre	
Primary suture of profundus tendon in hand	1
Total	82
Total flexor tendons repaired during 1 year	40

Extensor tendons done in Casualty not included (several hundreds per year).

AGE, SEX, OCCUPATION

Table II classifies the cases by age, sex and occupation. Of the 41 cases, 70% were in adults (over 15 years old)

TABLE II. AGE, OCCUPATION, AND SEX

	No. of Cases
Age in years	
1– 5	5
5–15	7
15–40	23
40–60	6
Occupation	
Machine workers	15
Glass workers	2
Farmers	2
Plumbers	2
Fireman	1
Painter	1
Engineer	1
Laboratory Assistant	1
Sex	
Males	34
Females	7

* From a paper read at the Birmingham Accident Hospital on 21 February 1955.

and as many as 30% in children under 15. 83% were males, the proportion of males to females being 5:1. Although only 2 of the 41 patients were glass workers, in 14 cases the tendons were cut by glass. O'Shea (1939) found that in 53% of his 870 cases the tendons were severed by broken glass. The 15 machine workers all sustained their injuries at work. Siler (1950*a*) reported that in a series of 84 flexor-tendon injuries at Cincinnatti General Hospital 52% were caused by knife cuts; males also predominating in this series (73%).

PRIMARY TREATMENT

For the indications of primary and delayed suture or grafting, other works should be consulted. There is hardly a paper that does not stress the importance of primary attention by an experienced surgeon. This is ideal but, alas, not always possible. The great majority

TABLE III. EXAMINATION AND PRIMARY TREATMENT IN CASUALTY

	No. of Cases
Attended to by Surgeon	4
Attended to by Registrar	4
Attended to by Casualty Surgeon	33
Time interval between Injury and Primary Treatment	
1–6 hours	6
6–12 hours	26
12–24 hours	0
2 days	2
3 days	1
Longer than 3 days	6
Cause of Injury	
Cut by glass	14
Sharp object or blade	15
Crush injury	8
Site of Injury	
Wound over proximal phalanx of thumb	10
Wound over middle phalanx of fingers	5
Wound between distal palmar crease and proximal interphalangeal crease	15
Wound proximal to distal palmar crease	10
Nature of Wound	
Clean	26
Dirty	4
Lacerated	7
Primary Skin Suture	
In Casualty Theatre	26
In Main Theatre	2
Primary Nerve Suture	3
Multiple Injuries	
Skin loss	1
Fracture of phalanx	1
Nerve injury	5
More than one digit involved	7
Antibiotics	
Penicillin	19
Sulphonamides	1

of the tendon injuries in this series were handled primarily by house surgeons, although in many more than indicated the surgeons were consulted (Table III). In the absence of experienced opinion, the medical attendant should do the minimum, mostly a careful toilet of the wound and skin suture. In this series 28 cases were given a primary wound-toilet and skin-closure; but 7 cases were only seen in casualty on or after the 3rd day of injury and in these the wounds were dressed, but not closed (Table III). Drains should never be used. O'Shea (1939) found that 40% of 53 cases that were drained became infected.

It cannot be stressed sufficiently that the primary treatment is as important as the delayed repair or the subsequent rehabilitation, if not more so. In each case, when first seen the following points should be carefully considered:

1. *Is primary tendon suture indicated?* Consider the age and occupation, the nature of the injury and state of the wound, and theatre facilities and available surgeon. If these requirements cannot be fulfilled, consider

2. *primary wound-toilet and skin-closure with subsequent (delayed) repair* (Fig. 1). Consider the age, work, mental make-up, associated injuries, and operative facilities. If the chances are that tendon repair would not yield satisfactory results, rather perform a

3. *primary amputation* and get the patient back to work in 3 or 4 weeks. A neat amputation is not such a cosmetic drawback and functionally it may be infinitely more desirable than a poor tendon-repair (Fig. 2). The operation for restoring tendon function entails meticulous attention to detail and considerable technical skill; the assessment of damage and management of injury demand great judgment and personal insight. In Fig. 3 the patient still has 5 fingers but the hand is relatively useless. When amputation was suggested to him at the follow-up, he felt that the finger was only in his way, but that he could not leave his work at this stage to have it amputated.

The *time interval* generally regarded as safe for primary tendon-suture is 6 hours. With modern aseptic surgery and antibiotics, in the clean case it can probably be done much later than this (Mason 1954). Koch and Mason (1933) produced an excellent result after primary suture of the flexor profundus over the distal interphalangeal joint 24 hours after injury. Tendon division over the distal half of the middle phalanx should almost always be sutured as a primary procedure, especially when more than one finger is involved. At this site there will be no interference with the sublimis action. If left, the retracted profundus may adhere to sublimis and limit the movement of all finger joints. An immediate suture may not result in full movement of the terminal phalanx, but full movement at the terminal finger joint is not as important to a working man as control of this joint. Even if adhesions do form after primary suture at this level, the finger tip will be strong, stable and under control.

The sublimis when intact should never be sacrificed for profundus action, especially in a labourer. In one of my patients a deep cut extended over the distal finger-crease of the middle and ring fingers of the right hand, penetrating the joints. The joint capsules were closed by small sutures before suturing the profundus tendons, although the wounds were badly lacerated. The patient had only 50% of movement afterwards in the terminal interphalangeal joints, but full stability, which to him meant a 'normal hand'. He was back to work in 5 weeks.

It has been shown that *antibiotics* prophylactically do not materially change the incidence of infection. It might be wise, however, to put all these cases on penicillin in high doses for a few days (Tables III and IV).

Skin sutures should not be removed too early. Some

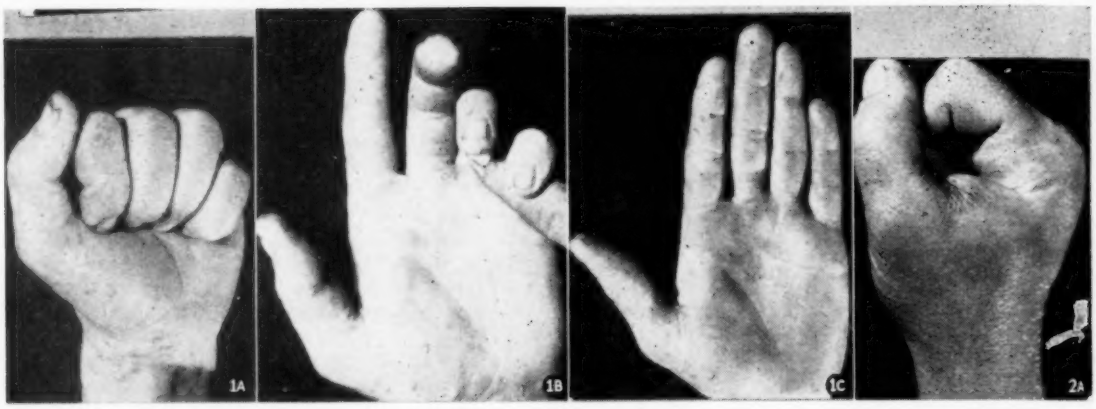

Fig. 1A, 1B and 1C. Both ring-finger tendons damaged in the theca. Primary wound-closure and delayed palmaris-graft. At the time of operation a good paratenon was noted; length was adequate, fixation secure both ends, and the tension just right. Perfect result.

Fig. 2A and 2B. Crush injury to proximal phalanx of index finger. Primary amputation. Back to light work in 3 weeks. Patient very satisfied—does not 'know' there is a finger missing.

Fig. 3. Lacerated wound with skin loss and division of tendon over the middle phalanx. Successful primary pectoral flap. Delayed sublimis graft. A plumber, discharged from hospital 11½ months after injury, with a sensitive stiff finger. Primary amputation was indicated.

Fig. 6A and 6B. A fair result after delayed suture of the flexor pollicis longus. Although there is some contracture and marked limitation of flexion, the patient carried on with his work and was satisfied. Our only 'failure' after pollicis repair.

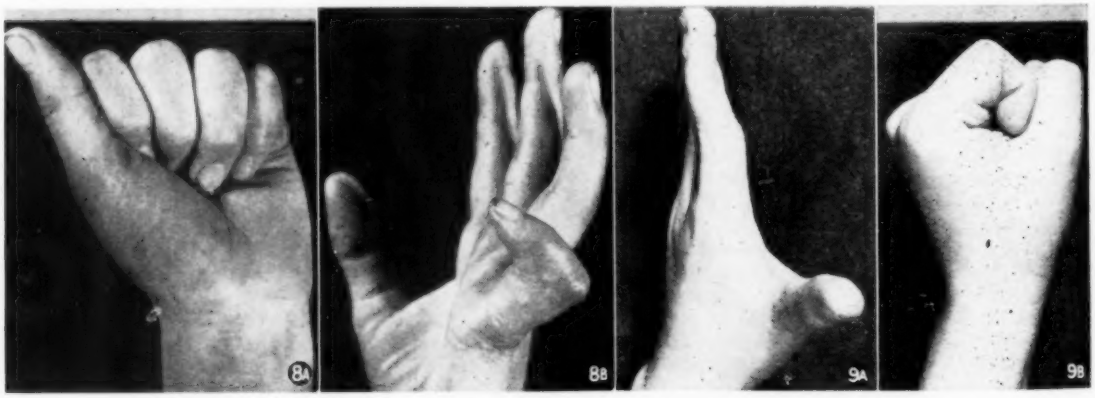

Fig. 8A and 8B. Both tendons cut over web of little finger in an 8-year-old girl. Delayed profundus-suture without sublimis excision. Later followed by sublimis graft from ring finger. Full flexion, but shortening, contracture, and gross limitation of extension. Fair result.

Fig. 9A and 9B. Palmaris-longus graft in a 6-year-old boy. Excellent result.

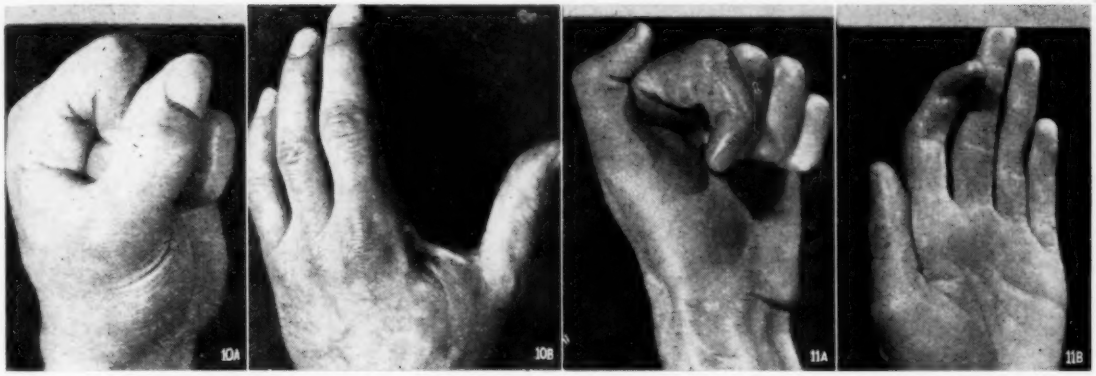

Fig. 10A and 10B. A tendon injury over the proximal phalanx was treated by primary wound-toilet and skin-closure and delayed sublimis-graft. Amputation, after tenolysis failed to improve a fair result. The patient is very satisfied and described his hand as 'perfect'.

Fig. 11A and 11B. This patient was discharged from hospital after two failed palmaris-grafts, with a sensitive stiff finger which forced him to a change of work. Surgeons are often reluctant to amputate useless fingers after repeated endeavours to repair a tendon. Compare Fig. 10A and 10B.

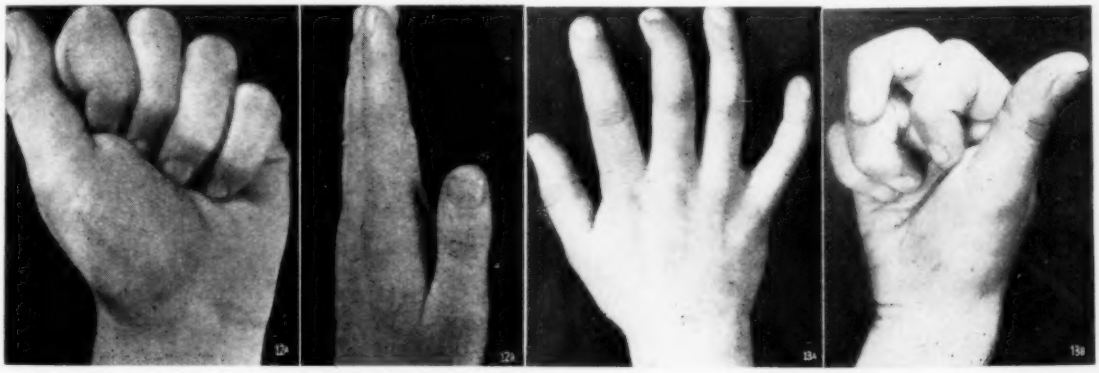

Fig. 12A and 12B. This 6-year-old boy was treated by primary wound-closure, after both tendons were cut to the middle finger. Distal sublimis excised and proximal sublimis sutured to profundus. Excellent result.

Fig. 13A and 13B. Primary closure of wound over the distal palmar crease in a 5-year-old boy. Delayed profundus-suture, sublimis not excised. Tenolysis did not improve this fair result.

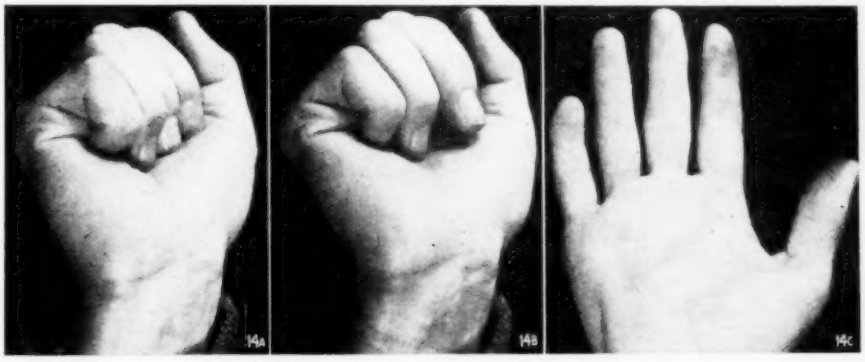

Fig. 14A, 14B and 14C. Wound over proximal phalanx. Both tendons severed. Primary skin-closure and delayed palmaris-graft. A trick movement may convert this good result to an excellent one.

wounds open after premature suture removal, especially in wounds over the creases. This is even more likely to happen when immediate active movements are encouraged. As with any tissue, rest is beneficial after injury. Early movement 'to prevent the joints from getting stiff', is unscientific and promotes excessive scar-tissue, which itself causes loss of movement. Unless there is serious joint-damage, adequate finger exercises and assisted *physiotherapy* will provide full passive movements, even after 2 or 3 weeks' complete rest to achieve sound healing. If the finger is immobilized for the first 10-14 days and movements then encouraged, the optimal condition will be reached 4-6 weeks after injury, when tendon repair can be performed. Physiotherapy seldom makes stiff fingers work, but it prevents mobile joints getting stiff. Some cases develop a certain amount of stiffness if postponed too long. Good results, however, have been observed 9 months or longer after injury.

TABLE IV. FOLLOW-UP AFTER PRIMARY TREATMENT

Average time for re-attendance	6– 8 days
Removal of sutures	6–14 days
Average	9 days
	No. of Cases
Encouraged to start active movements within	
1st week	11
2nd week	15
3rd week	2
Healing of Skin Wound	
Within 2 weeks	25
Longer than 2 weeks	6
Referred to Surgeon's Clinic	
2 weeks	23
1 month	8
2 months	1
Referred to Rehabilitation Unit	
After 2 weeks	8
After 4 weeks	5
Infection	3

A full passive range of movement is essential before any form of tendon repair is embarked upon. Post-operative active movement can only be as good as passive movement was before the operation.

SECONDARY REPAIR

Nowhere should traumatic surgery be more 'atraumatic'. Special fine skin-hooks, fine forceps, and light instruments are essential. A lead hand is sometimes of more value than an assistant. A good anaesthetist is almost as important as a good surgeon—for the procedure may be a long one. Needless to say, a brush-over with mercurochrome or iodine before operation is quite inadequate—the patient's hand should be surgically as sterile as that of the surgeon before he dons his gloves. A bloodless field under a pneumatic cuff-tourniquet is quite essential—at least during the dissection stage. Careful surgeons like to release the tourniquet after every hour.

The Exposure

A postero-lateral incision as advocated by Rank *et al.* (1951) was used in the majority of cases in this series. The skin flap is thin where raised and, dissected free in front of the nerve, gradually increases in thickness towards the base. This gives an excellent exposure in the finger. I personally prefer a postero-lateral incision from the tip to the base, cutting boldly down on the theca. The skin, subcutaneous fat and neuro-vascular bundle are lifted forwards in one block. It has the following advantages:

1. No incision lines crossing the tendon.
2. No danger to the neurovascular bundle, which lies far forward (Fig. 4).
3. Timid and exploratory cutting, 'trying to save the nerve', is avoided, thus limiting scar tissue and fibrosis —the arch-enemies of good function.
4. Preservation of the *accessory sheath*, as I would like to call it. In a number of cadaver, post-morten and operative dissections, I have seen a smooth, shiny, almost synovial-like layer of areolar tissue between the theca proper and the overlying subcutaneous tissue

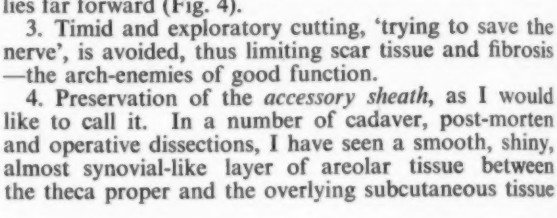

Fig. 4. The neurovascular bundle dissected out to illustrate its anterior relationship in the postero-lateral incision.

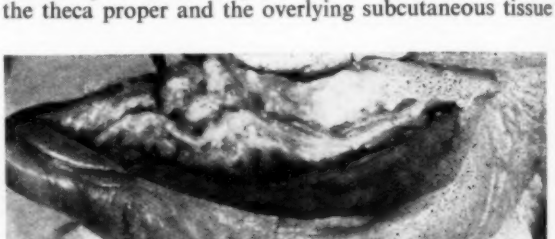

Fig. 5. The postero-lateral incision. The skin, neurovascular bundle and subcutaneous fat reflected, exposing the 'accessory sheath'. Perfect exposure with minimal trauma; the two phalangeal pulleys and distal end of profundus clearly visible.

(Fig. 5). This, I believe, is most important in contributing to the formation of a soft, unscarred gliding mechanism after tendon repair.

5. Exposure is as good as with any other procedure and is less time-consuming. No adverse effects have been seen after cutting of the dorsal branch of the digital nerve, and haemorrhage is not troublesome.

Bruner (1951) stresses the importance of correctly placed incisions in reconstructive surgery of the hand.

Even the most expert suturing of a tendon leaves some irregularity at the suture line, from where 'un-

satisfied' fibres reach out to the surrounding structures, which firmly immobilize the tendon (Bunnell 1944). From an experimental study Skoog *et al.* (1954) hold the opposite view, viz that the attachment is mainly due to ingrowths from adjacent paratenon to the injured part of the tendon. Either way, however, the end result is a frozen finger. To overcome adhesions in the rigid thecal cylinder is the greatest problem in restorative surgery. Countless ways of suturing, replacing or isolating the tendon have been tried. The secret, no doubt, does not lie in more complicated manoeuvres, but in the careful application of basic principles; and a faultless technique acquired over many years.

There are two practical ways out of this dilemma:

1. *Thecal resection, partial or complete.* Local excision of the theca over the excursion of the suture line prevents the tendon from sticking to the theca. Adhesions to subcutaneous fat, which have more give, are not so serious. In children especially the result is very satisfactory.

2. *Replacement of the injury site by a smooth healthy tendon graft.* Here no adhesions should form in the thecal tunnel.

Direct Suture

This may be done primarily, or as a delayed procedure. When both tendons are cut, the distal sublimis must be excised. Tables VIII and IX bear out the truth of this statement. With retraction and shortening of the proximal profundus, the sublimis acts very well when sutured to the distal profundus. Otherwise it may either be tucked away or cut short. Pulleys over the suture-line excursion are bound to cause trouble and should be excised with the theca—new ones can easily be formed.

TABLE V. SECONDARY REPAIR

	No. of Cases
Time Interval from Injury to Secondary Procedure	
1 month	4
1½ months	8
2 months	8
3 months	9
4-8 months	7
9 months	1
Joint Function before Operation	
Passive range:	
Full or almost full	17
More than half	18
Less than half	1
Sensation	
Full	22
Loss	1
Partial	5
Trophic changes	0
Scarring Found at Operation	
Severe	14
Slight	14
Secondary Nerve Suture	
Sutured	1
Neurolysis	1
Attempted but failed	1
Procedure of Tendon Suturing of Grafting	
Direct Suture:	
Profundus to Profundus	10
Profundus to Sublimis	4
Flexor Pollicis Longus	3
Sublimis transplant	1
Tendon Graft:	
Palmaris Longus to thumb	6
Palmaris Longus to fingers	14
Sublimis to fingers	3
Toe Extensors	4
Profundus of finger	1
Nature of Paratenon	
Good	3
Bad	1
Suture Material	
Silk	5
Stainless steel	9
Mersilene	3
Braided nylon	1
Tension of Graft	
Positive	9
Equal	3
Negative	0

Entire removal of all scar tissue is advisable. Tendon strippers (Bunnell 1918) are still used, but the use of these instruments cannot be advocated. In no case in this series has the pull-out suture of Bunnell been used. An end-to-end figure-of-eight suture, or a modification of this, was usually employed, the knots being tied on the outside of the tendon or between the stumps (Table V). The choice depends on the individual surgeon and provided the work is well done, the one is about as good as the other.

Tendon Grafting

Grafts are divided into those gliding in a synovial sheath and those containing an areolar paratenon. If grafts of the first variety are used (sublimis or profundus), as much as possible of the sheath should be left. This provides a future synovial covering; and experimental work has shown that such grafts develop an excellent gliding mechanism. Therefore, to use a sublimis graft with the theca removed is to rob the tendon of one of its major adjuncts to a good result. Kyle and Eyre-Brook (1954) claim a 75% success with sublimis graft and an intact theca.

The second type of graft—palmaris and the toe extensors are those most commonly used—does not develop a synovial sheath; the loose, elastic, areolar paratenon forms the gliding mechanism. Thus, as much as possible of the fibrous theca should be excised; it serves no purpose and may only lead to scar formation and restricted movement. From these remarks it is obvious that the type of graft should be selected at the time of operation. If the finger is 'one block of fibrous tissue', complete excision and a paratenon-covered graft is the answer. If the synovial sheath is in good condition a sublimis graft may be used without excising the sheath. To confuse these important mechanisms is often to be frustrated by 'inexplicable disappointments'.

The absence or limitation of terminal phalangeal movement has been conspicuous. However carefully the profundus stump is sutured, scarring and adhesions form over the volar aspect of the joint and middle phalanx. Only technical perfectionists can always be sure that the suture line is distal to the joint (Fig. 5). This complication can be avoided by complete excision of the profundus and fixation of the tendon, covered by paratenon, to the terminal phalanx. A pull-out suture placed far forwards prevents nail-bed complications. In one of these cases a toe extensor was split and sutured around the terminal phalanx; no adhesions and almost 100% function resulted.

Repair of flexor pollicis longus

Functionally, the thumb forms the opposing half of the hand. It acts as a separate functional unit, where stability and control are much more important than mobility. While a stiff interphalangeal joint of a finger may hamper movements of the hand, a stiff interphalangeal joint of the thumb may hardly be noticed. Conservative surgery is here the key word.

The flexor pollicis longus is usually damaged over the proximal phlanx, where it may be sutured primarily or repaired later by direct suture, graft or transplant.

Because of contracture (Fig. 6) that sometimes develops after a long incision to expose the retracted proximal

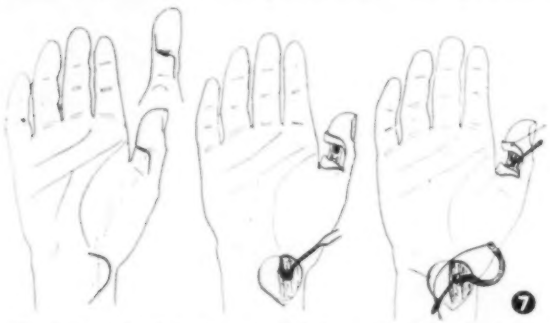

Fig. 7. Repair of the flexor pollicis longus in the early clean case by primary suture and later by direct suture or grafting. This method prevents contracture, avoids digital nerve damage, provides the most adequate synovial covering, and produces the least trauma.

tendon-end, we expose the distal stump by small extensions of the wound. The long flexor is exposed above the wrist by a small curved incision and an opening made in the synovial sheath. After delivery of the tendon, a soft probe is passed inside the synovial sheath distally, taking the threaded tendon end along. The thin sheath is excised over the suture line excursion. This has been done in the early clean case as a primary procedure, and also in the delayed suture or graft (Fig. 7). The advantages are obvious.

The ring-finger sublimis is most useful and satisfactory as a transplant, but the extensor carpi radialis has been used by some people (Luckey *et al.*, 1947).

After-care

The most satisfactory dressing was found to be one layer of gelonet and a few thin layers of wet cotton-wool. Soaking-wet 1-inch gauze loosely applied keeps this in position. The dressing is completed by dry cotton-wool, crepe bandage and a dorsal plaster-slab, with the fingers in a position of function and slight flexion at the wrist. The tourniquet is undone, watching the return of circulation. If colour changes do not correspond to that of the other fingers, it is far safer to re-dress the wound. No difference has been noticed between those cases where the tourniquet was removed during operation and haemostasis secured, and those where it was removed after the final dressing was applied. A roller bandage elevates the hand, prevents post-operative oedema, and reduces the risk of haemorrhage.

In an excellent experimental study of the tensile strength of tendons, Mason and Allen (1941) found that early active use and mobilization gave rise to bulbous thickening at the sutured ends and dense peritendinous adhesions, which defeated the whole purpose of early movement. Tendons that were completely immobilized developed first-class sliding mechanisms. All the cases in this series (Table VI) have been immobilized for at least 2 weeks. Pulvertaft (1948) commences movement straightaway and claims superior results. Immediate, active, unguarded movement after 3 weeks of immobili-

TABLE VI. FOLLOW-UP AFTER THE SECONDARY PROCEDURE

	No. of Cases
Immobilization	
Immediate active movement	0
Movements after two weeks	14
Movements after three weeks	19
Movement after five weeks	3
Referred to Rehabilitation Unit	
Immediately	0
2 weeks	2
3 weeks	18
5 weeks	5
7 weeks	2
Infection	1
Various Sensory Changes	8
Repeat Operations	
Re-exploration	3
Tenolysis	8
Re-suturing	1
Re-grafting	2
Digital amputation	
Partial	1
Total	2
Bow Stringing	6
Scarring	6
Contracture	4
Back to Previous Work from Time of Injury	
3 months	2
4 months	6
5 months	4
6 months or longer	11

zation may be associated with stretching of the suture line, and always leads to increased reaction. One often finds that all splints are completely discarded after 3 weeks. In one of my cases a perfect primary direct suture was carried out over the proximal phalanx of the index

TABLE VII. OVER-ALL RESULTS

Results	*No. of patients*
Success	
Excellent	7
Good	15
Total	22
Failure	
Fair	8
Poor	11
Total	19

% success 56
Patients satisfied with end-result—29.
Patients dissatisfied with end-result—12.

finger. While demonstrating in follow-up at 5 weeks that his finger tip could almost touch the palm the patient used too much force. The result was a complete dehiscence of the tendon; and he had to undergo a second operation. Supervised physiotherapy is the surgeon's responsibility, the importance of which cannot be over-stressed. To refer patients at this important stage to people unfamiliar with tendon injuries is asking for disaster.

Tenolysis

Tendon repair should be such that tenolysis is seldom a necessity. There is no time like the first time. Primary repair, when indicated, is very satisfactory; but a delayed repair on a failed case is not only much more difficult but more liable to failure. Immediate active and passive movements after tenolysis are essential. In this series, 8 cases were subjected to this operation (Table VI). Most were disappointing. Pulvertaft mentions 20 cases, of which the majority show recovery to a high degree. Graham (1947) reports that operative

tenolysis with the use of tendon strippers has given satisfactory results.

Tendon Repair in Children

The principles underlying the repair of severed tendons in a child are exactly the same as those for an adult. The child has youth on his side; the remarkable powers of reconstitution of damaged tissues and adaptation of function ensures a superior result to the equivalent in an adult. Nature, however, cannot rectify a wrong surgical procedure (Table VIII, Fig. 8). Postponing operation for any length of time is unnecessary; it only deprives the child of a better chance to regain normal function and activity. Immobilization after repair is as essential as for the adult—even more so, because the child cannot understand the significance of the injury and fails to cooperate. Physiotherapy afterwards is not necessary. The correct repair in a child should yield satisfactory results (Fig. 9).

TABLE VIII. THE RESULTS OF SECONDARY REPAIR IN CHILDREN UNDER 10 YEARS

Age in years	*Method*	*Digit involved*	*Result*
6	Palmaris graft	Index	Excellent
7	Palmaris graft	Ring	Good
2	Palmaris graft	Index	Good
6	Sublimis to Profundus—distal Sublimis excised	Middle	Excellent
5	Proximal Sublimis sutured to Profundus—distal Sublimis not excised	Middle	Fair
8	Profundus sutured to Profundus. *Later Operation:* Sublimis graft to ring finger	Little	Fair
6	Profundus to Profundus—Sublimis excised	Middle	Fair
3	Profundus to Profundus—Sublimis not excised	Little	Fair
3	Profundus to Profundus—Sublimis not excised	Little	Bad
		Total	9
		Success	4
		Failure	5

RESULTS

The results of tendon repair has until very recently been painfully disappointing. A reviewer in the *Lancet* (1941) said, 'If the sheath is involved the prognosis is hopeless'. Jones (1944) thought it worth while reporting a 'successful suture of finger flexor tendon'. Fortunately the picture is no longer so gloomy, as the results will indicate.

Blum (1942) found it so difficult to appraise the results of tendon surgery in a statistical fashion that he chose a clinical exposition to present the procedure of myotomy as an auxiliary to tendon repair. Controllable and uncontrollable factors makes comparison of one's own end-results, as well as those of others, almost impossible. A relatively clean wound, early operated on with the most perfect atraumatic technique and a good functional result, may be useless to the first violinist. Similarly, a badly crushed finger in a manual worker, with subsequent infection and ultimate amputation, may result in a thankful patient with a useful hand.

Various criteria for classifying results have been used. Individual differences, even on the same classification, are frequent, and photographs are notoriously deceptive. Despite all these difficulties however, surgery of the hand demands a common platform for discussion and comparison.

In classifying results, the cosmetic appearance is important; but the emphasis should always be placed on function. Consider the function of thumb and fingers as separate units, but also as individual digits. Fingers may act singly or in combination as *pincers, antennae, hooks, a press, or a vice.* The patient's age and occupation also influence the final assessment. Together with the above considerations, we have used the following practical scheme: *An excellent result:* Where the finger tip reaches to within ½ inch of the distal palmar crease; there is full extension and no sensory disturbance. *A good result:* Where the finger tip reaches to within 1¼–1½ inches of the distal crease; there is almost full extension and no sensory loss. *Fair or bad results:* Those with less flexion than above, limitation of extension, ankylosis, contracture, or sensory changes. In the present analysis the first two are classed as successes, the last two as failures.

TABLE IX. THE RESULTS OF DIRECT SUTURE

	Result	*Previous Operation*	*Subsequent Operation*
Profundus to Profundus			
With excision of Sublimis ..	Success 2	0	0
	Failure 1	0	1
Without excision of Sublimis ..	Success 0	0	0
	Failure 7	0	3
Profundus Sutured to Proximal Sublimis			
With excision of distal Sublimis ..	Success 2	0	0
	Failure 0	0	0
Without excision of distal Sublimis	Success 0	0	0
	Failure 2	0	1
Flexor Pollicis Longus			
	Success 2	0	0
	Failure 1	0	0
Transplant			
Flexor Sublimis of ring finger to thumb	Success 1	0	0
Total Success of Direct Suture 6			
Total Failure of Direct Suture 11			

TABLE X. THE RESULTS OF TENDON GRAFTING

Donor Graft	*Result*	*Previous Operation*	*Subsequent Operation*
Palmaris Longus			
To fingers	Success 7	0	0
	Failure 3	0	3
To thumb	Success 6	0	1
	Failure 0	0	0
Toe Extensors	Success 2	0	0
	Failure 2	0	0
Sublimis	Success 0	0	0
	Failure 2	1	1
Profundus	Success 0	0	0
	Failure 1	0	1
Total Success of Grafting 15			
Total Failure of Grafting 8			

The patient's own ideas about the injury and subsequent surgical intervention are sometimes illuminating (Table

VII). Amputation seems to be a shameful admission of failure; yet in the case illustrated by Fig. 10 the patient had an almost normal functioning hand. He volunteered that there was nothing he could not do with this hand, yet it was classed as a failure (compare Fig. 10 with Fig. 11).

On the above basis Table VII shows an over-all success rate of 56%. The series has really been over-critically assessed. Many of these 'failures' will probably be regarded elsewhere as successes. Tables VIII, IX and X indicate results with various methods of repair. In 5 cases of delayed primary suture with excision of sublimis, 4 were successful (Fig. 12). In 9 cases the sublimis was not excised, and every one ended in failure (Fig. 13). The palmaris was the most commonly used graft; it proved successful in 10 out of 13 cases (Fig. 14), In the thumb 8 of the 9 repairs were successful (Fig. 6).

COMPARISON WITH THE RESULTS OF OTHER WORKERS

Garlock (1956) divided his tendon injuries into 5 groups:

1. Immediate primary tenorrhaphy: 16 cases repaired in the palm with 9 good results, 3 fair and 4 poor.
2. Early secondary tenorrhaphy within 6 weeks: 6 good, results 2 fair and 1 poor.
3. Late secondary tenorrhaphy after 6 weeks: 3 good results, 1 fair and 2 poor.
4. Late secondary repair with soft-tissue reconstruction: 2 good results, 3 fair and 2 poor.
5. Tendon grafting: 1 good result, 2 fair and 1 bad.

O'Shea (1939) reported on a large series of 870 severed tendons; 15·1% of the operations became infected (this was in the pre-antibiotic era). In his series of followed-up cases, 9 flexors of the fingers were excellent, 20 good and 16 unsatisfactory.

Miller (1942) gave a statistical analysis of 300 cases of severed tendons operated on by a fixed house-staff at the Detroit Receiving Hospital. Of 58 flexor tendons followed-up, 72·4% gave good results. His lowest percentage success of 64 was over the proximal phalanx (this corresponds with our experience). The flexor pollicis was repaired in 9 cases with 8 successes.

In a series of 21 cases, all but one operated on by himself, Kinmonth (1947) had only 4 failures. Pulvertaft (1948) in 20 injuries of tendons in the theca, claimed 75% success in 13 cases and 50% or less in 4 cases (3 too early to assess). In 9 cases with flexor pollicis injury, he did one primary and one delayed suture, both with 75% recovery. Elongation and suture yielded 2 full recoveries and 2 with 50% recovery. A graft was used in 3 cases, with 50-70% recovery.

An interesting analysis of the results of primary tendon-suture at the Cincinnatti General Hospital has been reported by Siler (1950*a*). A total of 35 surgeons in the Graduate School of Surgery performed the operations. 65 cases attended follow-up. Pollicis-longus suture gave 3 excellent results, 5 good and 1 fair. In the fingers, 32 repairs gave 3 excellent, results, 17 good, 9 fair and 3 poor. Out of 24 injuries in the palm, 9 results were excellent, 11 good, 1 fair and 3 bad. They classified as follows: Excellent—80% function with no nerve lesion; good—50% function and no nerve lesion; fair and bad, those with less function, ankylosis or nerve lesion.

Jennings *et al.* (1952) reported on the results obtained in 21 unselected severed tendons with the use of a new type of suture. Of these cases 11 were in the palm or fingers, in which 4 results were good, 4 fair and 3 poor. A good result was one where the finger tip could be approximated to 1 inch from the distal crease and a fair, between 1 and 2 inches. Siler (1950*b*) showed an over-all success of 74%. In a consecutive series of 57 cases, operated on by Eyre-Brook and analysed by Kyle (1954), the results of a single surgeon over a 6-year period are given. Their results are very similar to ours, except that the sublimis was their most effective graft in 20 cases, with 75% success. Palmaris yielded 50% success. Cases of direct suture of the profundus were satisfactory in 6 out of 9 cases.

In a recent paper by Bogdanov (1955), the results of a number of Russian surgeons are given in flexor and extensor tendon repairs. We were impressed by their uniform good results. They claimed 100% satisfactory results in extensor injuries in two series. The best flexor-tendon series claims 83% good results. Bogdanov bases his paper on a personal series of 375 cases; of these 123 were industrial injuries, of which only 28 had simple isolated tendon-injuries and the remaining 95 had accompanying extensive skin-defects, fractures or nerve-lesions. Despite these handicaps he shows 75% good results in flexor tendons and 89% in extensor. Unfortunately, the exact criteria for good and bad results were not given. We have not yet achieved this degree of success.

Watson (1955) published his results in 51 cases as follows: in the palm—4 were normal, 1 very good and 3 improved; direct suture of the flexor pollicis longus—5 very good and 2 improved, and 3 very good after a free graft; simple attachment of the profundus—normal in 5, improved in 5, and 1 case had a stiff but stable joint; division of both tendons and replacement by a free graft—8 very good, 7 improved, 2 poor and 2 failed, and 3 improved but too early for final assessment. The terms used in assessment may be difficult to evaluate.

THE IMPORTANCE OF HAND SURGERY

Many writers have stressed the importance of hand surgery. There are still, however, big hospitals even in industrial areas where 'hand surgeons' and hand clinics do not exist. Table XI is submitted as a plea for the establishment of a hand clinic in every centre where hand injuries are dealt with. Our duty as surgeons is not only to restore movements to a damaged finger, but to assist in getting the patient back to work as soon as possible. The majority of these patients are not able to resume their old job for many months after the injury (Table VI). Dr. Allen Kanavel has righty remarked that the hand of the working man is his most valuable asset. Without it, life becomes a burden.

TABLE XI. FREQUENCY OF HAND OPERATIONS IN TRAUMATIC SURGERY DURING 1 YEAR (JUNE 1953—JUNE 1954) AT THE BIRMINGHAM ACCIDENT HOSPITAL

Main Theatre	
Total number of operations	2,180
Hand operations	275
Percentage hand surgery	12·5%
Casualty Theatre	
Total number of operations	15,439
Hand operations:	
Local Analgesia	5,359
General Anaesthesia or Brachial Plexus Block	1,346
Percentage hand surgery	43·5%
Total percentage hand operations in Hospital during 1 year	39%

CONCLUSION AND SUMMARY

That tendon surgery has progressed by leaps and bounds is without question; but there still remains a great leeway to make up. The excellent experimental and clinical work of people like Mayer, Koch, Allen, Mason, Bunnell and Biezalski, to name but a few, made one hesitant to publish this small contribution. However, careful follow-ups are relatively uncommon in the literature; because of this, a large number of tendon injuries were studied, 41 cases were analysed, and suggestions are put forward to improve the outcome in tendon surgery.

Emphasis is placed on adequate assessment when first seen, with primary amputation where indicated.

The postero-lateral incision is advocated, preserving the accessory sheath. Thecal excision over the suture line is important. The rationale for excising or preserving the theca in tendon grafting is explained. A method of repairing the flexor pollicis longus is shown. Tenolysis in our hands was unsatisfactory. Tendon repair in children should not be postponed, and with the correct procedure should almost always yield satisfactory results.

The end-results in a series like this cannot be expected to be as good as those of individual experienced surgeons in this field. Nevertheless, they compare favourably with those of other series. Results improve with the years as the technique is mastered. The results in the latter part of the period reviewed were far superior to that in the beginning. At the same time we must remark on the unpredictability of tendon repair. Sometimes, after what was thought to be an ideal repair, the result would be disappointing; in other cases, when the worst is expected the end-result is surprisingly good.

Comparison of end-results clearly indicates how difficult assessment is with different criteria. The time has come to institute a standard classification.

By rigidly applying to the theatre and follow-up clinic the basic principles of tendon healing studied in the laboratory, the surgeon will more and more approach functional perfection, which, of course, is the objective in tendon repair.

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THE DOMICILIARY TREATMENT OF PULMONARY TUBERCULOSIS

A SOCIO-ECONOMIC AND CLINICAL REVIEW

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With the introduction of effective drugs for the treatment of tuberculosis it has been possible during the last few years to treat patients in their homes.

In this article the results of domiciliary treatment of patients suffering from pulmonary tuberculosis are evaluated in relation to the socio-economic conditions of the area. The patients are all Natives residing in the semi-urban area of Evaton, which is served by the Evaton Health Centre.

The epidemiology of tuberculosis and its spread within the family and among the population under conditions of domiciliary treatment is under review and will be dealt with in a further communication.

Environmental Backgrounds

The old tenets of treatment—adequate rest, fresh air, and a wholesome diet still remain the foundations of modern therapy, and with the Natives in this area the environment and the socio-economic conditions continually exert a detrimental effect on the patient. Whole families live in one or two rooms and ventilation is rigidly excluded. Hygiene and the ordinary comforts of life are at an extremely low level. The patient sleeps on the floor in the corner of the room and the rest of the family including children occupy the same quarters.

Economically, if the breadwinner has contracted tuberculosis the situation is indeed grave, for the family income ceases and the family are forced to live on their meagre savings or obtain credit from neighbours and relatives. The diet, at the best lacking in protective foods, is further reduced at a time when, especially for the children in contact with the patient, a full balanced diet is essential. Such conditions often force the patient, regardless of his disease and treatment, to find work, which is often unsuitable. One patient under these circumstances returned to his job of delivering coal on his back.

Again, psychologically the influences are detrimental. The patient is forced into idleness. It has been found that the drugs employed produce a remarkable euphoria.

The patient feels well regardless of his X-ray result or sputum report. He cannot find sheltered employment and being idle takes naturally to gambling and drinking. In one case an investigation revealed that the family income was derived solely from the gambling activities of the patient.

Illustrative Case

J.M. X-ray report—bilateral caseous tuberculosis with cavity formation. Sputum positive.

The patient, his wife and 5 children were living in 2 small ill-ventilated rooms. The patient before his illness was employed at a garage and earned £2 per week. For 7 months he attended regularly for treatment and some improvement was noted in his general condition. Food parcels and a disability grant (£1. 1s. 0d. per month) were provided.

The grant however was insufficient for the family needs, and debts accumulated. J.M. returned to work at the garage and had to cycle 12 miles a day. His sputum was positive and cavities were still present in his lungs. In 5 months his condition had deteriorated and he agreed to be admitted to hospital. On the day of his admission his wife deserted him, with the result that he had to return home to look after his children. He had to cease work, his grant had been stopped, and his financial position was worse than before. He also had the added responsibility of caring for his children, who fortunately showed no signs of the disease. He attended and received treatment for a further 3 months but he gradually deteriorated in health. He was finally admitted to hospital where he died 2 months later. The family left the district and have remained untraced.

Environmental Therapy

The Health Centre organization with its specially-trained staff is able to deal with the problem of tuberculosis not only as a disease requiring therapy of the clinical condition but as a total complex with clinical, social, economic and environmental aetiology affecting both the patient himself and his immediate family and the community at large.

Within the means at our disposal as much is done as possible but the measures instituted rather alleviate than cure the social ills and often the help given is insufficient to cope with the problems arising from the disease.

When a patient is diagnosed as suffering from tuberculosis he is immediately made a 'Special case'. A trained health assistant is assigned to the family. He explains all aspects of the disease to the patient and his relatives. Emphasis is placed on the spread of the disease and stringent measures are taken in regard to the disposal of sputum and, as far as possible, even in one room the patient is placed apart from the rest of the family.

Regular supplies of milk are given to the invalid and to any small children in the household, A request is made to the Native Affairs Department to supply food parcels and an application is made for a disability grant. Any family problems are dealt with or referred to the Native Commissioner for advice. All members of the household are recorded and examined at intervals to detect any spread of the disease in the family. Regular visits are paid to these cases and any difficulties are reported to the medical officers of the Centre.

Medical Therapy

Comprehensive X-ray, laboratory and specialist services are available for all cases of tuberculosis. A suspect is sent to hospital, where full investigations are carried out either in the out-patient department or on admission for a day or two. The patient is then returned to the Health Centre, where the treatment is administered. If he is unable to attend, a Native nursing sister visits him in the home. The usual routine therapy for an adult is streptomycin, 1 g. thrice weekly, and isonicotinic acid hydrazide, 400-600 mg. per day. The patient is weighed regularly, sputum tests are made at monthly intervals, and X-rays are taken every 3 months. During the period under review, owing to a shortage of hospital beds it was very difficult to admit patients who were not making progress or were remaining sputum-positive. The position has now changed and beds are available for all such cases. Again the social implications must be stressed. When the patient is admitted to hospital the disability grants cease and the family is left without means of support—a situation which often causes the patient to abscond from hospital.

A complication of treatment among the Natives is that this illness is still regarded as a 'Native disease'. The protracted nature of the therapy and the slow progress gives credence to this view. In a certain number of cases, though good progress has been made, the patient has vanished to consult a witch-doctor or prophet in a neighbouring location. The influence of the primitive is so great that nothing can be done to prevent this action, which causes the further spread of the disease and a marked deterioration in the patient's condition.

ANALYSIS OF THE RESULTS OF TREATMENT

1. *Incidence*

In spite of treatment, control of the disease in the area served by the Health Centre is lagging far behind, as is shown by the increased incidence of tuberculosis in this area. The figures showing the increase are based on the diagnosis of cases at the Health Centre. The patients attend for some complaint, often unrelated to tuberculosis. Some are referred by general practitioners or from the local hospitals. Other cases are brought to light in the course of area visiting by the Centre's health assistants. Thus a fairly accurate estimate can be made of the incidence of *known cases* in the population (about 50,000). The following table shows the annual incidence of all forms of tuberculosis recorded in this manner.

Year ended 30 June.	*No. of new cases*
1951	26
1952	31
1953	35
1954	47
1955	91

During the last 6 months in 1955 there have been 96 fresh cases—more than the total for the full previous year. These figures show an increase year by year which is reaching alarming proportions. No special measures such as mass X-ray of the population have been undertaken neither has the increase in population nor increased attendance at the Centre been responsible for the rise in these figures; it is due to the natural spread of the disease within the community.

2. *Age Distribution*

The following table shows the age distribution of cases attending the Health Centre, classified in 3 clinical groups (primary tuberculosis excluded).

	Age-groups (years)					
	11–20	21–30	31–40	41–50	51	*Total*
Tuberculosis infiltration in one or both lungs ..	6	10	13	6	9	44
Caseous-calvitating tuberculosis in one or both lungs	5	20	12	16	6	59
Pleural effusion ..	0	5	3	1	3	12

3. *Sex Distribution*

The sex distribution was as follows:

Males	*Females*	*Total*
79	42	121

In this series the number of males constitute 65% of the total. The excess of male cases over female is attributed to the long hours of work and the great distances to the places of employment, the continual strain of heavy labour, and a diet lacking in protective foods. The women either remain at home or work as domestic servants in European households.

4. *The Results of Sputum Tests*

Sputum tests are important not only as a guide to the progress of the individual case, but as an indication of the extent of infection in the community. The results are set out in the following table, in which the cases are classified into the same 3 clinical groups as in the table (age distribution) above:

Type	*Negative*	*Positive to Negative*	*Pos. to Neg. with subsequent Reversal to Positive*	*Persistent Positive*	*Nil Result*	*One Positive Result*	*Total*
Tuberculous infiltration in one or both lungs	19	8	2	2	8	5	44
Caseous-cavitating tuberculosis in one or both lungs	6	18	5	5	13	12	59
Pleural effusion	8	0	0	0	4	0	12
	33	26	7	7	25	17	115

In 51% of all cases the sputum was either negative or reversed to negative under therapy. The average time for reversal was 3 months. In 12% of all cases therapy had no beneficial effect on the sputum, which remained positive or reversed from negative to positive. The cases in the 2 columns 'nil result' of 'one positive result' (37% of the total) were difficult to assess because the patients either left the district, or were admitted to hospital or died before further sputum specimens could be obtained.

No case of pleural effusion was found with a positive sputum.

5. *The Results of Domiciliary Treatment*

It would be over-optimistic to regard cases as cured, since relapse is common. The satisfactory cases are discharged to surveillance and are examined at 3-monthly intervals. The criteria for regarding a case as satisfactory are as follows: The patient must be afebrile and asymptomatic; there must be no clinical signs in the chest; the gain in weight must be satisfactory; the X-ray must show healing of the lesions or fibrosis; the sputa must be negative on 2 sucessive occasions. In the analysis presented below, if the investigations were not completed or if the patients had left the district, the results were regarded as undetermined. In the column headed 'less than 3 months therapy' are placed patients who did not receive treatment and those who received less than 3 months' specific therapy. This group had suffered from tuberculosis before the advent of the specific therapy or, after the inauguration of the therapy, had not attended for longer than 3 months at the time of assessment.

RESULTS OF DOMICILIARY TREATMENT

Type	*Satisfactory Results*	*Unsatisfactory Results*	*Result undetermined*	*Less than 3 months therapy*	*Totals*
Tuberculous infiltration in one or both lungs	20	6	11	7 including 3 deaths	44
Caseous-cavitating tuberculous in one or both lungs ..	13	24 including 6 deaths	9	13 including 12 deaths	59
Pleural effusion ..	6	1	3	2	12
	39	31	23	22	115

Most of the cases, omitting those in the 'less than 3 months' column, received specific therapy for a period of 15 months, although not all patients attended regularly during this time.

As one would expect, the early infiltrative lesions have shown a more satisfactory response to therapy than the advanced caseous type. In this latter group the mortality is significantly less ($t = 8$) when adequate therapy has been given. These results confirm clinical impressions. Several cases have been under treatment with tuberculosis so advanced that the prognosis was hopeless and therapy was given only as a palliative measure. Most of these cases, especially in the aged, have shown remarkable general improvement although the X-ray findings were by no means satisfactory.

The clearing of the pleural effusions was a slow process, with therapy lasting at least a year.

These results emphasize 3 points:— ..

1. The importance of early diagnosis.

2. The effect of treatment in reducing mortality even in advanced cases.

3. The large number of cases in which, even with efficient surveillance, the results were undetermined. This is because of the nature of the treatment and the fact that the patients, for various reasons, failed to cooperate.

6. *Weight Gain in Relation to Therapy*

A remarkable gain in weight has been observed in patients who are making good progress. The range of this gain has been from 2 to 33 lb with an average of no less than 13 lb and a monthly increase of about 1 lb. Detrioration is usually followed by a loss of weight, but in some patients a gain of 3-13 lb occurred without reversal of the positive sputum result or improvement in the X-ray findings. Relapse has been noted at the peak of the gain in weight. In one case a severe relapse followed a gain in weight of 27 lb.

COMMENTS AND REVIEW

Throughout the years the incidence of tuberculosis among the Native population has increased to an alarming extent. The costs of building institutions reached such high proportions that to offer institutional treatment to all the cases suffering from tuberculosis became impractical from the economic angle. At this time, with great imagination and foresight, Mr. Paul Sykes demonstrated that tuberculotics and their dependants if necessary, could be accomodated and treated in settlements at reasonable cost. Furthermore he established a Friends of the Sick Association which took care of the families in their homes. This concept showed a remarkable grasp of the tuberculosis problem in all its manifestations. Subsequently the South African National Tuberculosis Association (SANTA) was founded with funds to build settlements throughout the country.

At this time the epoch-making advances in therapy were introduced. Epidemiological principles worked out over the years were thrown overboard. All and sundry were given their injections and often tablets without injections. In the Evaton area tuberculosis is spreading rapidly, and it is the opinion of many workers in this field that the incidence of the disease is increasing throughout the country. Before the introduction of INH and streptomycin the cases soon became bedridden and limited the spread of the disease to the immediate household. The high death-rate also limited the spread in time. The drugs now used permit the patient to be ambulatory without any guarantee that he is sputum-negative, with the result that he is able to spread the disease over wider areas over longer periods of time. Thus benefit to the individual may be detrimental to the community unless the most rigid methods of control are observed. A review of the situation becomes necessary. The value of effective drugs established first in the laboratory, then in the human subject, must not be finally assessed at this stage but investigated further and tried on man in his environment. This is the *de facto* crucial test. If the response is unsatisfactory in a bad environment and satisfactory in a good environment then we have established a social test as valid as any laboratory investigation and the remedy will lie in improving the environment. It is submitted that the effect of chemotherapeutic and antibiotic drugs in cases of tuberculosis diminishes in proportion to diminishing living-standards and that any programme of treatment must take this into account. At present only far-advanced cases or those not responding to treatment are recommended for admission to hospitals or settlements, the remainder being considered suitable for domiciliary treatment. Such a policy does not take into account environmental influences nor is it any aid to the control of the disease.

Admission of all cases to hospitals or settlements until a reasonable stage of recovery is reached and then continuing the therapy at home under surveillance would offer better chances of cure and control.

The present welfare measures are meagre and inadequate in regions where the local authority is inactive and SANTA. organizations have not been established. It would be of great benefit if voluntary tuberculosis committees, could place certain funds in a national pool to help such areas. The only welfare care available to families of Native tuberculotics at Evaton is from the King George V Silver Jubilee Fund. The finances of this fund are altogether insufficient to meet the increasing demands placed upon it; and the result in most Native areas is that no other help is available for the dependants.

In some areas sheltered employment has been found for patients who have recovered. Such schemes should be organized on a national basis with the cooperation of employers, who often as a matter of principle discharge a healed tuberculotic whether the work is suitable or not.

Any citizen who is a potential danger to the public whether he drives a car, possesses a firearm or suffers from tuberculosis, should be under the control of legislative measures. However unpleasant, submission to free treatment should be compulsory for all sufferers from tuberculosis.

SUMMARY

1. The living conditions and the socio-economic problems of Native tuberculotics having domiciliary therapy are described.

2. An outline of domiciliary therapy both social and medical, is given.

3. The incidence of tuberculosis is increasing in this area in spite of the therapeutic measures adopted.

4. An analysis is given of 115 cases:

(*a*). The age and sex distribution is given,

(*b*) In 51% of cases the effect of therapy on the sputum result is satisfactory, in 12% of cases unsatisfactory. The effect in the remainder of cases could not be determined.

(*c*) The results of therapy are analysed. Infiltrative cases made greater progress than the caseous type with cavities. With negligible treatment under these con-

ditions the prognosis is extremely poor for patients with gross lesions in the lungs.

(*d*) An analysis is made of the weight gains.

The number of successful and unsuccessful results have been recorded. Even when recovery has been reported, there always remains a doubt regarding the permanency of such results. There is also a group of patients in whom the outcome cannot be determined; amongst these are the patients who have tired of the long therapy, those who have gone back to work and others who have consulted witch doctors. Such cases are an out-of-control group and an integral part of the social therapeutic complex resulting from domiciliary treatment.

5. Finally a review is made of the problem of tuberculosis in the Native population, and the view is expressed that in spite of chemotherapy the incidence of the disease will continue to increase unless socio-economic evils are remedied and adequate institutional accommodation provided for cases.

RHESUS IMMUNIZATION IN PREGNANCY

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An analysis of 66 cases of Rhesus immunization seen at Addington Hospital, Durban, during a 2-year period (1 August 1951 to 31 July 1953) is presented. During this period, 4,064 deliveries took place, of which 2,282 were of Europeans.

The percentage of women who were found to be immunized to Rhesus is 1·62. This figure is much lower than that given by most hospitals, probably because 43·8% of the cases confined at this hospital and by its district maternity service are Coloured and Indian women, in whom the incidence of Rhesus-negative individuals is much less than in Europeans (see below).

The Rhesus Clinic of the hospital has referred to it cases of Rhesus immunization from the whole of the province of Natal.

Two of the 66 Rh-immunized cases ended in abortion before the fifth month.

TABLE I. BABIES BORN TO 64 RH-IMMUNIZED WOMEN

A. *Rh-positive babies:*	
1. Coombs-test positive and affected clinically	47
2. Coombs-test positive and unaffected clinically	6
3. Coombs-test negative	1
B. *Rh negative babies*	10
	64

TABLE II. FATE OF THE 54 RH-POSITIVE BABIES

Lived	44
Died	5
Stillborn	5
	54
Causes of Death (prenatal and postnatal)	
Hydrops foetalis	3
Macerated foetus	2
Kernicterus	2
Icterus gravis	2
Unknown (stillbirth, no P.M.)	1
	10

TABLE III. TYPES OF DELIVERY IN RH-POSITIVE BABIES UNAFFECTED CLINICALLY

Vaginal Delivery, not induced	6*
Induction of Labour	0
Caesarean Section (at 37 weeks)	1
	7*

* Including 1 Coombs-test negative (the rest were Coombs-test positive).

TABLE IV. TYPES OF DELIVERY, TREATMENT AND FATE OF THE 47 RH-POSITIVE, CLINICALLY AFFECTED BABIES

	Vaginal Delivery, not Induced	*Premature Induction by Rupture of Membranes*	*Caesarean Section*	*Totals*	*Died after Birth*
Exchange Transfusion	19	1	7	27	3
Direct Transfusion	5	0	0	5	0
No Transfusion	9	0	1	10	2
Stillborn	4	1	0	5	—
	37	2	8	47	5

TYPES OF DELIVERY OF THE 5 BABIES WHICH DIED AFTER BIRTH

Vaginal Delivery, not Induced	4
Induction of Labour	0
Caesarean Section	1

Expected date of Delivery. Of the 37 Rhesus-positive babies which were purposely allowed to proceed to term, only 7 went beyond their expected date, of which 6 passed the expected date by 2-8 days, whilst the 7th case (kernicterus) passed the expected date by 28 days. Of the other 30 which were born before the expected date, 10 were born approximately at term, and the other 20 before the expected dates by the following periods:

Length of Time before Expected Date (Days)	*No. of Cases*
9	2
10	2
14	6
18	1
24	1
30	3
35	1
36	1
38	1
48	1
53	1
	20

Of the above 20 cases, 18 were affected clinically, of which 9 received exchange transfusions. Not one baby of the 20 weighed less than 5½ lb.

According to this small number of cases, it seems that there is a natural tendency for Rhesus-positive cases to be delivered before the expected date.

Of the 37 Rhesus-positive babies in which vaginal delivery was allowed without induction, 4 were stillborn and 4 died after birth. The date of birth (in relation to the expected date) in the 8 dead babies was as follows:

Died after birth (4):

Case 1. Born 14 days before the expected date of delivery (hydrops—lived 20 minutes).
Case 2. Born 28 days *after* the expected date of delivery (kernicterus).
Case 3. Born 5 days before expected date of delivery (icterus gravis).
Case 4. Born 18 days before the expected date of delivery (kernicterus).

Stillborn (4):

Case 1. 6 days before expected date (Stillborn, no post-mortem).
Case 2. 30 days before expected date (macerated foetus).
Case 3. 14 days before expected date (macerated foetus).
Case 4. 14 days before expected date (hydrops foetalis).

TABLE V. RELATIONSHIP BETWEEN PREVIOUS HISTORY AND THE FATE OF THE RH-POSITIVE CHILD

Previous History		*Lived*	*Died*	*Stillborn*
None (36)	No treatment	10	2	3
	Treatment	21	0	0
Definite (15)	No treatment	3	0	2
	Treatment	7	3	0
Uncertain (3)	No treatment	2	0	0
	Treatment	1	0	0

A 'previous history' includes cases in which one or more previous babies had haemolytic disease, or where the mother had been blood-transfused. It can be seen that out of 15 cases with a definite history only 10 lived, whereas out of 36 cases with no history 31 survived.

THE ANTIBODY TITRE

(A) *Rh-positive infants with Coombs test positive, unaffected clinically*

There were 6 cases in this group and 3 were primigravidae. Study of the antibody titre revealed that in not one case was the mother's albumin agglutinin titre higher than 256. The series is too small to draw definite conclusions, however.

(B) *Rh-negative infants born of Rh-negative mothers who showed evidence of Rh-immunization*

There were 10 cases in this group and not one was a primigravida. Only one gave a history of having had a blood transfusion previous to the present pregnancy. The highest albumin agglutinin titre present was 512 in this group. One must assume that in 9 of the cases the antibodies were provoked by a previous pregnancy.

(C) *Rh-positive infant, Coombs test negative*

One case only (para 1, gravida 2). Highest albumin agglutinin titre during the pregnancy was 8.

(D) *Rh-positive infants, Coombs test positive, affected clinically, received exchange transfusion*

1. Sub-group treated by Caesarean section. (excluding neonatal deaths, *q.v.*): This sub-group comprised 6 cases treated by Caesarean section at between 36 and 38 weeks' gestation. Lowest birth-weight recorded was 5 lb. 12½ oz. The highest albumin agglutinin titre recorded in the mothers' blood antenatally was 1,024 and in not one case was there a synchronous drop of the saline agglutinin titre with a rise in the albumin agglutinin titre—said to indicate a severe degree of immunization by some authorities.[1]

2. Sub-Group treated by Spontaneous Delivery (excluding Neonatal Deaths, *q.v.*): This sub-group comprised 16 cases. Study of the saline and albumin agglutinin titre revealed that no inference could be drawn about the prognosis of the child. The saline agglutinin titre in one case (para 1, gravida 2) rose to 16,384, with albumin agglutinin titre rising to 2,048, the day before delivery. The earliest titre during the pregnancy was at the 26th week (by her dates) (complete 512, incomplete 32). The infant was severly affected, being jaundiced at birth, with hepatomegaly and splenomegaly, and a haemoglobin of 82%; 10 normoblasts/100 white cells; serum bilirubin 3·7 mg.%; Coombs test strongly positive. It received 730 c.c. of female Rh-negative blood while 670 c.c. of its own blood was removed. The baby survived.

(E) *Rh-positive infants, Coombs test positive, affected clinically, either direct transfusions or no transfusion used (excluding neonatal deaths)*

Comprises 13 cases. Five received small direct transfusions, the remainder no transfusions at all. These cases were regarded clinically as of mild degree only. No inference may be drawn from the study of the agglutinin titres. In 11 of the cases the highest albumin agglutinin titre in the mother's blood, antenatally, was 512, while in the remaining 2 cases one showed an albumin agglutinin titre of 1,024 as its highest level, 2 weeks before delivery, whilst the other showed a titre of 2,048 in both the saline and albumin agglutinin estimations just before delivery.

(F) *Rh-positive infants, Coombs test positive, stillborn or died within 24 hours of birth*

Ten cases—5 stillborn and 5 died. In 3 of these cases only could the agglutinin titre be said (by present-day standards) to be prognostically helpful. Two of these were shown at post-mortem to be cases of kernicterus. Case 1 kernicterus showed a rise of albumin agglutinin titre from 512 to 2048, with a synchronous fall of saline agglutinin titre from 128 to 64, 6 days before delivery. Case 2 kernicterus showed a saline agglutinin titre of 128 with an albumin agglutinin titre of 8192 3 weeks before delivery. This titre fell to 32 and 1024 respectively 6 days before delivery. Case 3 (macerated foetus) showed an albumin agglutinin titre of 32,768 10 days before delivery.

In the other 7 cases, definitely no help could be gained by knowledge of their agglutinin titres. The 3 cases of hydrops foetalis showed surprisingly low agglutinin titres, the highest readings of albumin agglutinin titres being 1024, 512, 32. In all 3, there was no synchronous lessening of the saline agglutinin titre associated with a rise in the albumin agglutinin titre. Thus it can be

readily seen that the agglutinin titre is not very helpful from a prognostic point of view.

1. ANTENATAL ROUTINE

At Addington Hospital, blood is taken for Rh grouping from all patients at their first antenatal visit, and if Rh-negative, the blood is tested for antibodies; it is tested again at 30, 34, 36 and 38 weeks for antibodies. The cord blood of all infants is sent to the Rhesus laboratory, regardless of whether the mother was Rh-negative or positive, and the following tests are made: (1) Wassermann reaction, (2) haemoglobin estimation, (3) Coombs test. In cases where, during the pregnancy, the mother showed evidence of immunization the same tests are made on the cord blood, and also the following investigations: (4) Rhesus type of the blood, (5) Megaloblasts per 100 white blood-corpuscles, (6) Serum-bilirubin level.

2. PROGNOSIS

(*a*) *Before Delivery*

As can be seen from the previous paragraphs, the mothers' antibody-titre level during pregnancy has been a disappointing guide in prognosis. The finding of agglutinins before the fifth month, usually indicates that the woman has been immunized before she became pregnant. A titre of agglutinins, particularly the albumin variety, which increases considerably during the pregnancy, may indicate that the foetus is Rh-positive, but more than this one cannot say.

The antenatal elicitation of pitting oedema of the foetal scalp is a sign I have found to be extremely valuable in diagnosing hydrops foetalis in cases where the X-ray appearances are doubtful. J. C. M. Browne (1950) has pointed out that the radiological signs of this condition are not reliable and may be present when the foetus is normal and healthy. Most cases of Rh immunization occur in multiparae, and in them, with vertex presentation, one can usually palpate, the foetal head vaginally through the multiparous os, aided by pushing the vertex into the pelvis, and decide whether pitting oedema is present, which it is suggested, is diagnostic of hydrops foetalis. This sign can be used in the later weeks of pregnancy. During labour one can, with experience, differentiate the oedema caused by a caput succedaneum from that felt in a case of hydrops foetalis. The latter is less rubbery and more diffuse, and more easily 'pitted into' with the fingers, and if one can gain access beyond the periphery of the caput succedaneum, one can easily decide if it is a case of hydrops or not.

(*b*) *After Delivery*

The affected infant's condition at birth is placed into one of 3 categories, namely severely affected, moderately affected, or mildly affected. The serological tests together with the infant's clinical condition at birth, (namely, whether jaundiced or cyanosed, and the presence of splenomegaly) are taken into account in placing the infants in these categories.

The presence of jaundice at birth, or its onset within a few hours, has been stated by Mollison *et al.*[2] to be the most reliable clinical sign of severity. This has been our experience also, as has been the finding of these authors that the degree of anaemia in the cord blood is the most valuable laboratory index of severity.

The normal megaloblast count is taken as 5 or less per 100 white cells, and normally they disappear from the blood within a day or two of birth. When the megaloblast count is pronounced it is highly suggestive evidence of erythroblastosis foetalis.

It has been shown that erythroblastaemia is a very common feature in infants born to diabetic or prediabetic mothers.[3, 4]

The normal serum-bilirubin level is taken as approximately 1·7 mg. per 100 ml. at birth.[5] A raised serum bilirubin is a valuable corroborative finding, provided it is not an isolated serological item.

The percentage of kernicterus in the present survey is 3·8% out of 53 Coombs-test positive infants. Stiller[6] found that 14% out of 29 patients with haemolytic disease failed to develop normally and were obviously backward at the age of one year. Mollison[2] has stated that the incidence of kernicterus when all degrees of haemolytic disease are included may well prove to be lower than 14% because Stiller's series included mainly moderate or severe degrees of the disease.

The two cases of kernicterus in this survey showed a cord haemoglobin concentration at birth of 4·4 g. and 16·9 g. per 100 ml. respectively. Armitage and Mollison[7] suggest that a cord haemoglobin of 17·5g. per 100 ml., or higher, is a strong indication that the infant will not develop kernicterus if left untreated.

3. TREATMENT

(*a*) *Obstetric Management*

Our present method of management at Addington Hospital is one of conservative treatment of the mother. We allow the mothers to have a vaginal delivery at term unless other obstetric reasons are present which may indicate premature induction of labour or Caesarean section. We found that this method gives as good results as premature induction of labour, if not better, largely by eliminating the premature infant, which in addition may occasionally be Rh-negative. From this small series, it seems that there is a tendency for these immunized mothers to go into spontaneous labour somewhat before the expected date, but our birth weights do no indicate any infants that can be classed as premature, taking 5½ lb. or below as the standard of prematurity. We now regard Caesarean section as having no place in the management of an immunized mother.

(*b*) *Indications for Transfusion*

The infants are grouped as stated in the section on 'Prognosis after Delivery'. The severely and moderately affected ones are, as a rule, immediately treated by exchange transfusion. The mildly affected ones are not usually given any immediate treatment; they are often found to be the first affected infants in a family. They are closely observed and are given direct transfusions should their haemoglobin levels, which are estimated daily, drop.

We follow the advice given by Mollison and Cutbush[8] that a haemoglobin value of below 15·5 g.% if supported by other evidence of the disease, should be taken as an indication for treatment. The degree of sensitization of the infant's erythrocytes and the degree of erythroblastaemia are unreliable guides, usually. Occasionally in mild cases erythroblastaemia is absent even on the first day of life.

(*c*) *Technique of Exchange Transfusion*

Apparatus Drip stand, Rh-negative Group-0 blood, normal saline (2 vacolitres), blood set with filter, 2 three-way cocks in series, small, medium and large plastic catheters,[9] 2 10-c.c. glass syringes with finger controls, cord scissors, dissecting forceps (toothed and plain), artery forceps (medium), metal probe. Heparin (for intravenous use). Sp. vini rect., gauze swabs, cord dressings, cord ligatures.

The Polyethylene catheter is not autoclaved but kept in 1% Cetavlon; it tends to float in this solution and so must be kept down by a weight. The lumen of the catheter must be syringed with Cetavlon, for the Cetavlon does not enter the lumen readily.[10]

Technique (time allowed 1½–3 hours). The blood set and filter, three-way cocks, catheters and syringes are rinsed through with normal saline. The contents of the second vacolitre of normal saline are poured into a bowl and heparin is added (1 c.c. per 200 c.c. of normal saline) for use during the procedure, e.g. for rinsing syringes to prevent sticking.

The infant is placed with its feet at the end of the bed or table, and the legs are immobilized in a blanket. The arms may be adequately immobilized by folding the vest or jacket upwards over the arms.

The abdomen and cord are cleaned with Sp. vini rect. and draped with sterile towels. The cord is held vertically by the artery forceps with which it is clamped (an assistant does this) and is cut through, 1 to 1½ inches from the umbilicus.

The cut surface is carefully examined for bleeding sites. The umbilical arteries usually go into spasm more readily than the vein, though not invariably, and will therefore ooze less. The presence of a patent urachus is looked for.

The medium catheter is rinsed in heparinized saline, and passed into the lumen of the vessel which oozes most. If the vessel is very tortuous it may be necessary to straighten out the spiral twists in the cord by passing a metal probe first. Resistance is felt at the umbilicus and spasm of the vessel may be felt gripping the tip of the catheter. Gentle, steady pressure will usually overcome these. The catheter may be passed to a depth of 3-4 inches, until greater resistance is felt.

When the tip of the catheter reaches the mouth of the ductus venosus, or the portal vein, blood may well out of the open end of the catheter, but more probably it will have to be withdrawn to prevent the vessel wall collapsing against the opening in the tip of the catheter. Spasm of the vessel may persist up to half an hour, but will suddenly relax, allowing free withdrawal of the blood.

All 3 vessels may have to be catheterized before the vein is found and blood withdrawn.

The three-way cocks are now affixed to the catheter, and the syringe applied to their free end. 10 c.c. of blood are withdrawn and ejected *via* the waste cock into a receiver. From the bottle of donor blood on the drip stand, 10 c.c. are allowed to run into the syringe by opening the appropriate cock. This blood is slowly injected into the umbilical vein.

This procedure is continued, 10 c.c. out and 10 c.c. in, until the required amount of blood has been replaced. It is convenient to have someone recording the figures on paper. The total volume given is calculated on the basis of 100 c.c. per lb. body-weight. If the donor blood has been slightly packed, i.e. about 15% plasma decanted, then 100 c.c. is withdrawn for every 100 given. Otherwise, for every 100 c.c. withdrawn, an extra 10 c.c. is given. This is done to try and get the maximum final haemoglobin level.

When the syringe becomes sticky it may be rinsed in the heparinized saline. Delay over rinsing may give the blood time to clot in the catheter. The second syringe can be used while the first is being rinsed. Changing catheters during the procedure is a messy business.

The infant's condition is watched constantly, particularly for signs of respiratory or circulatory collapse. The infant should be kept at a consistently warm temperature. Sedation has not been found necessary. Lethargy appears to be proportional to the amount of haemolysis that has taken place *in utero*.

Finally the catheter is slowly withdrawn and the cord stump clamped with artery forceps as close to the umbilicus as possible. The stump has usually become oedematous from handling and may be friable. A cord ligature is then necessary in addition to the clamp. Cord dressing and binder are applied. The infant is left in the crib for 8-12 hours, after which time it may be treated as a normal child, nursed and breast fed if the mother's condition is satisfactory.

Daily haemoglobin estimations on capillary blood from the heel are done for a week, and then weekly until spontaneous erythropoiesis is established—usually by the 6th week.

(*d*) *Value of Blood from Female Donors*

In reviewing 208 cases of erythroblastosis treated by exchange transfusion, Allen *et al.*[11] noted that although the mortality was 15·1% in the whole group, no deaths occurred in the 42 babies who received blood from females. Analysis of other factors, such as sex of the infant, severity of illness, the mother's anti-Rh titre and length of gestation failed to reveal any other factor that could be held responsible.

At Addington Hospital the statistics of the Paediatric Department do not confirm this superiority of blood from female donors. (Dr. H. L. Wallace).

(*e*) *Treatment of Erythroblastosis by Transfusion with sedimented Red Cells*

Pennell[12] treated 33 patients with erythroblastosis foetalis by transfusion of compatible sedimented red-cells from bank blood; 3 died (10·7%)—a mortality which compares favourably with that in other reports on exchange transfusion. He argues that incomplete or blocking or albumin Rh antibodies require an 'activator', which is supplied by both human and bovine albumin, to effect agglutination of red cells. This 'activator' is diminished to an ineffectual level in the plasma of the newborn. He says the adult plasma or serum causes pronounced agglutination of red cells, which are coated with the blocking (or albumin) antibody. It is thought, therefore, that transfusion of erythroblastotic children with adult whole-blood may be contra-indicated because the infused adult plasma may activate the incomplete antibody present in the baby. Pennell holds that there are other advantages in transfusing with sedimented red-cells, viz.

1. Severe anaemia is overcome by a comparitively small volume (50-60 c.c.) which cannot overburden the infant's circulatory system.

2. The procedure is simple, and can be carried out *via* a scalp vein in 15-20 minutes.

3. Does not require special equipment or specially-trained transfusion teams.

4. Eliminates administration to the infant of a large amount of extraneous substances such as sodium citrate, heparin and calcium gluconate, which are employed in exchange transfusions.

The amount of adult plasma which sedimented cells contain is about 5%. The fact that the infant's coated cells are allowed to remain seems to be of no consequence.

At Addington Hospital, about 80-100 c.c. of visible

plasma is withdrawn from each 500 c.c. bottle of donor blood for both exchange and direct blood-transfusions.

(f) Breast Feeding

It is our practice to allow all infants, once their general condition allows of it, to be taken to the breast. The subject seems to be *sub judice*.

It is not possible, according to Marrack,[13] to say whether the small amounts of antibodies in the mother's milk are absorbed by the baby. Many authors have advised that infants affected with haemolytic disease of the newborn should not be breast-fed. Cathie[14] has published the results of some experimental work on this subject. He found that 12 Rh positive infants who received high-titre anti-Rh serum by mouth for a whole day in place of their normal feeds failed to show any evidence of antibody absorption; that is to say, their red cells did not give a positive direct anti-human-globulin test, nor did their serum appear to contain any free antibody. He also found that an Rh-positive infant with haemolytic disease, whose erythrocytes had first ceased to show a direct positive anti-human-globulin test, did not subsequently develop a positive test when fed for 24 hours with breast milk with a titre of 32.

4. MORTALITY RATE

(*a*) *Exchange Transfusion.* There were 6 deaths in 38 cases which received exchange transfusions (15·8%) —computed up to November 1953.

(*b*) *Rh-positive, Coombs-test positive.* Ten infants died out of 53 Rh-positive Coombs-test positive infants (18·9%).

(*c*) *Infants by Total Number of Immunized Mothers.* Ten infants died out of 64 Rh-immunized mothers (15·6%).

5. CONCLUSION

The writer has come to the following conclusions:

1. That the antibody titre in the pregnant immunized woman does not serve as a reliable guide to the severity of haemolytic disease in the infant.
2. That spontaneous vaginal delivery gives as good results as prematurely induced labour, if not better.*
3. That Caesarean section has no place in the management of the Rh-immunized woman.
4. That radiological evidence in the antenatal diagnosis of hydrops disease is often misleading.
5. That the elicitation in the later weeks of pregnancy of pitting oedema of the foetal scalp, by vaginal examination in the Rh-immunized woman, is often an invaluable aid in diagnosing the presence of hydrops foetalis, particularly where the radiological evidence is lacking or confusing.
6. That a large percentage of these Rh-immunized women go into spontaneous labour before their expected date.
7. That Indian women resident in Natal are virtually all Rhesus-positive. Not a single case of Rh-immunization was seen in 784 Indian antenatal patients over a 2-year period.
8. That amongst the Coloured population (people of mixed European and non-European extraction) in Durban, the incidence of Rh-immunization is extremely low. Five cases of Rh-immunization out of a total of 834 deliveries over a 2-year period were seen, a percentage of 0·59.
9. That the foetal mortality rate is higher in those cases in which the mother has given birth to one or more infants with haemolytic disease, or in which the mother had been blood-transfused previously.

* Armitage and Mollison[7] (1953) have come to the conclusion that routine premature induction of labour probably increases mortality.

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BOOKS RECEIVED : BOEKE ONTVANG

Collagen Diseases. By John H. Talbott, M.D. and R. Moleres Ferrandis, M.D. Pp. xv + 232. 30 Illustrations + 16 Colour Plates. $6.50. Grune & Stratton, Inc. 1956.

Rorschach Location and Scoring Manual. By Leonard Small, Ph.D. Pp. 214. $6.50. London and New York: Grune & Stratton, Inc. 1956.

Year Book of Neurology, Psychiatry and Neurosurgery—1955-1956 *Series.* Edited by Roland P. Mackay, M.D., S. Bernard Wortis, M.D., Percival Bailey, M.D. and Oscar Sugar, M.D. Pp. 576. $7.00. Chicago: Year Book Publishers, Inc. 1956.

Dynamics of Psychotherapy—The Psychology of Personality Change. Volume I. Principles. By Percival M. Symonds, Ph.D. Pp. xi + 211. $5.50. New York and London. Grune & Stratton, Inc. 1956.

Practical Haematology. (Second Edition). By J. V. Dacie, M.D. (Lond.), M.R.C.P. (Lond.). Pp. vii + 229, with 43 illustrations. 20s. net. London: J. & A. Churchill Ltd. 1956.

PASSING EVENTS : IN DIE VERBYGAAN

Research Forum, Department of Medicine, University of Cape Town. The next meeting will be held at 12 noon on Tuesday, 7 August 1956 in the large A-floor lecture theatre, Groote Schuur Hospital, Cape Town. Speaker, Dr. W. H. Muller; Subject, *Ovarian Hyperthecosis*.

* * *

Mr. R. Lane Forsyth, M.Ch., F.R.C.S.I., has been asked to represent the Royal College of Surgeons in Ireland at the inauguration of the South African College of Physicians and Surgeons which is to take place on 6-8 August 1956, at Johannesburg, and is to deliver an address which the Royal College has sent.

* * *

Members are reminded that they should notify any change of address to the Secretary of the Medical Association of South Africa at P.O. Box 643, Cape Town, as well as to the Registrar of the South African Medical and Dental Council, P.O. Box 205, Pretoria.

Failure to advise the Association can only result in non-delivery of the *Journal*. This applies to members proceeding overseas as well as to those who change their addresses within the Union.

* * *

Dr. Derek Jowell, B.A., M.B., Ch.B., of Cape Town, has obtained the qualification F.F.A.R.C.S. He has been appointed a resident anaesthetist at the Hammersmith Hospital, London.

* * *

Dr. N. J. Roos, M.B., Ch.B., Dip. O. and G., het as ginekoloog en verloskundige by Mediese Sentrum 210-211, Mooistraat, Welkom, begin praktiseer. Telefoon 151.

* * *

Professor R. H. Goetz, Department of Surgical Research, University of Cape Town, has left for the Continent to attend the International Congress of Physiology at Brussels from 30 July to 4 August where he will deliver a paper. He has been invited to take part in the International Symposium on the Physiological Effects of Gravitational Stress, under the chairmanship of Professor J. Jongbloed (Utrecht). Professor Goetz will represent the University of Cape Town at the International Congress on Diseases of the Chest at Cologne on 19-23 August and he will present a paper at the Congress of the European Society for Cardio-Vascular Surgery in Zurich. He will be away for 4 weeks.

IN MEMORIAM

ROBERT BAILEY, B.A., M.B., B.CH., M.D. (DUBL.)

Dr. Robert Bailey died peacefully at his home 'Elsenburgh', Malcolm Road, Rondebosch, Cape, on 11 July 1956 at the age of 76 years.

Dr. R. Bailey

He was born in Castleblaney, Ireland, in 1880. He studied at Trinity College, Dublin, and practised for a while in Newtownards, County Down, before coming to South Africa in 1914. He practised in Steynsrust, Orange Free State, for 2 years and was then appointed Railway Medical Officer and District Surgeon at Laingsburg, Cape Province.

In 1920 he was appointed Railway Medical Officer at Mafeking, where he worked until his retirement in 1946. During his years there he was keenly interested in the work of the St. John Ambulance and later appointed a Serving Brother. After his retirement he was resident in Johannesburg and later in Cape Town.

He leaves a widow, 2 daughters and 2 sons, both the latter being in the medical profession.

OFFICIAL ANNOUNCEMENT : AMPTELIKE AANKONDIGING

APPOINTMENT OF EDITOR

Applications are invited for the post of Editor of the *South African Medical Journal*. Applicants must be registered medical practitioners having knowledge and experience of medical journalism. A knowledge of languages will be a recommendation. The salary attaching to the post is on the scale £1,800×60—2,400, plus cost of living allowance of £352 for married men and £176 16s. 0d. for unmarried persons. (£100 of this allowance will be consolidated for pension purposes). The commencing notch will be according to experience, at the discretion of the Federal Council.

In addition to the Association's official *Journal*, the successful applicant will be required to edit the quarterly '*South African Journal of Laboratory and Clinical Medicine*'. He will also be required to join the Association's Superannuation Fund.

Applications, together with testimonials and a certificate of health, should be addressed to the undersigned to reach him before 31 August 1956.

A. H. Tonkin
Secretary

Medical House
35 Wale Street
Cape Town
19 May 1956

AANSTELLING VAN REDAKTEUR

Aansoeke word ingewag vir die betrekking van Redakteur van die *Suid-Afrikaanse Tydskrif vir Geneeskunde*. Applikante moet geregistreerde geneeshere wees met kennis en ondervinding van die geneeskundige joernalistiek. 'n Kennis van tale sal 'n aanbeveling wees. Die salaris aan die pos verbonde is op die skaal £1,800×60—2,400, plus 'n duurtetoeslag van £352 vir getroude mans en £176 16s. 0d. vir ongetroude persone. (£100 van hierdie toeslag sal vir pensioendoeleindes by die salaris gekonsolideer word.) Die beginsalaris sal na goeddunke van die Federale Raad met inagneming van vorige ondervinding vasgestel word.

Die applikant sal verwag word om benewens die redaksie van die Vereniging se amptelike *Tydskrif* ook dié van die kwartaalblad '*Suid-Afrikaanse Geneeskundige Tydskrif vir Laboratorium- en Kliniekwerk*' op hom te neem. Hy sal ook by die Vereniging se pensioenfonds moet aansluit.

Aansoeke, vergesel van getuigskrifte en 'n gesondheidsertifikaat, moet aan die ondergetekende gerig word om hom vóór 31 Augustus 1956 te bereik.

A. H. Tonkin
Sekretaris

Mediese Huis
Waalstraat 35
Kaapstad
19 Mei 1956

REVIEWS OF BOOK : BOEKRESENSIES

WHO PHARMACOPOEIA, VOL. II

International Pharmacopoeia. First Edition Volume II. Pp 350 + xx. £1 15s. 0d. Geneva: World Health Organization. 1955.

Contents: General Notices. 2. Monographs. Appendices. Annex. Index to Volumes I and II.

The activities of the World Health Organization in coordinating and unifying the health services of its member States led to the urgent publication of volume I of the International Pharmacopoeia. Volume II now supplies omissions from the first volume and deals with various forms of insulin, tubocurarine chloride, and with certain antibiotics and synthetic chemical drugs recently introduced into therapeutics. This volume consists of 217 monographs, 26 appendices on reagents, tests and assays, and 1 annex on solutions for cardiolipin and lecithin in serological tests. There is a table giving the usual and maximal doses for adults of the substances described in the volume. In addition there is a table of usual daily doses for children of drugs which are in general use in pediatrics. Another appendix contains a list of the International Biological Standards approved by the Expert Committee on Biological Standardization. All international standards at present available are in this list, not only those required for biological tests of the International Pharmacopoeia. The detailed alphabetical index in this volume includes that of volume I in order to facilitate reference, A list of the contents of volume I is also given in this volume.

The International Pharmacopoeia is only a recommendation and not a legal pharmacopoeia in any country unless adopted by the pharmacopoeial authority of that country. Any member State of the World Health Organization may incorporate a translation of all or part of the work in its national requirement.

N.S.

EAR, NOSE AND THROAT NURSING

Ear, Nose and Throat Nursing. By F. Boyes Korkis, M.B., Ch.B. (N.Z.), D.L.O. (Eng.), F.R.C.S. (Ed.), F.R.C.S. (Eng.), F.I.C.S. Pp. 168 + v, with illustrations. 12s. 6d. London: J. & A. Churchill Ltd. 1955.

Contents: 1. An Introduction to Otorhinolaryngology. 2. The External Ear. 3. The Middle Ear. 4. The Internal Ear. 5. The Nose. 6. The Throat. 7. The Trachea and Oesophagus. 8. The Out-Patient Department. 9. Pre- and Post-Operative Care of In-Patients. 10. Throat, Nose and Ear Operations. Index.

This is a new book designed to assist nurses in their care of ear, nose and throat cases. It is based on the experience gained in lecturing to nurses and cover the fields of anatomy, physiology and pathology so far as it is necessary for the nurse to have knowledge of these sciences.

The rest of the book deals with the practical aspects of the nurse's work in the out-patients' wards and the theatre of the Otorhinolaryngological Department.

The book is well illustrated and simply written and will be an asset to any nurse who wishes to make the best of her profession.

A.H.T.

OFFICIAL RECORDS OF THE WORLD HEALTH ORGANIZATION

Official Records of the World Health Organization No. 67. *The Work of WHO* 1955. *Annual Report of Director-General to the World Health Assembly and to the United Nations.* Pp. xxi + 241. 10s. Geneva: World Health Organization. 1956. Local Sales Agent: Van Schaik's Bookstore (Pty.), Ltd. Also available in French and Spanish.

Contents: Introduction. Part I. General Review. 1. Communicable Diseases. 2. Public-Health Services. 3. Environmental Sanitation. 4. Education and Training. 5. Peaceful Uses of Atomic Energy. 6. Services in Epidemiology and Health Statistics. 7. Drugs and other Therapeutic Substances. 8. Publications and Reference Services. 9. Public Information. 10. Constitutional, Financial and Administrative Developments. Part II. The Regions. 11. African Region. 12. Region of the Americas. 13. South-East Asia Region. 14. European Region. 15. Eastern Mediterranean Region. 16. Western Pacific Region. Part III. Co-operation with other Organizations. 17. Coordination of Work with other Organizations. 18. Expanded Programme of Technical Assistance for Economic Development. Part IV. Project List. Project in Operation in 1955. Annexes. 1. Membership of the World Health Organization. 2. Membership of the Executive Board in 1955. 3. Expert Advisory Panels and Committees. 4. Organizational Meetings and Meetings of Expert Committees and Advisory Groups held in 1955. 5. Tentative Schedule of WHO Organizational Meetings in 1956. 6. Non-governmental Organizations in Official Relations with WHO. 7. Regular Budget for 1955. 8. Structure of the Headquarters Secretariat. 9. Numbers and Distribution of the Staff. 10. Composition of the Staff by Nationality. Maps. 1. International Sanitary Regulations: Position at 31 December 1955. 2. Regions and Offices of the World Health Organization.

Introducing his Annual Report for 1955, the Director-General of WHO, Dr. M. G. Candau, points to a number of important new developments and changes of emphasis.

Perhaps one of the boldest measures yet taken against any one disease—the campaign aiming at the eradication of malaria in the shortest possible time, wherever this may be technically feasible —has been virtually dictated by the capacity of the anopheline mosquito to acquire resistance to insecticides. The operation and timing of the campaign will vary considerably; for certain countries it is believed that the spraying of houses over a period of four or five years will effectively break the transmission of the disease; elsewhere conditions are less favourable, and in some countries, particularly those of Africa, 'pilot projects' will be necessary before any full-scale eradication plan can be attempted.

Radical changes in methods of treatment of tuberculosis are considerably influencing the organization of programmes for its control. Now for the first time effective domiciliary drug-treatment of infectious cases, together with mass immunization and possibly chemoprophylaxis, may make it possible to treat patients and prevent transmission without the expensive organization that the conventional methods require and which are beyond the means of under-developed countries.

The problems entailed in the production and large-scale application of a safe and effective vaccine against poliomyelitis have been studied with the help of an international group of experts, who made some important recommendations.

The Director-General also draws attention to the numerous requests which the Organization has received from Member States for consultants on various aspects of trachoma control. Important advances have been made in the understanding of the epidemiology of this disease. In Morocco and Tunisia operations in 1955 were mainly directed against the seasonal conjunctivitis which often accompanies trachoma infection and a definite improvement in both the course and the severity of the underlying trachoma was noted.

Reference is also made to developments in connexion with the peaceful uses of atomic energy. One of the most urgent needs in this field is for trained personnel in the various categories. Specialized training is necessary for physicians and 'health physicists' who will work in atomic energy laboratories or plants and for medical users of radio-isotopes, and more general training is required for public-health administrators who will have to deal with problems of radio-active waste disposal and the protection of communities against the radiations which may be expected to result from the increasing use of atomic power in industry. There is also a need for the collection and distribution of information on a variety of medical and health problems arising from the use of atomic energy, the establishment of international standards and codes of practice, and the stimulation and coordination of research.

These various new developments must however be seen in their proper perspective within the context of WHO's long-term programme. Dr. Candau draws attention to the substantial success achieved during the year in 3 categories of programmes of fundamental importance: the fight against communicable diseases, the strengthening of national health services, and the raising of standards of education and training for all types of health personnel.

Progress was also recorded in such aspects of WHO's permanent world-wide services as the collection and distribution of epidemiological information, the improvement of vital and health statistics, and the establishment of international standards for drugs and other therapeutic substances. The International Sanitary Regulations, which in 1955 concluded their third year of operation, have now become the health charter for international travel for the greater part of the world.

In the body of the Report, these and many other subjects are

dealt with in more detail, and there are separate descriptions of work performed in each of the 6 WHO regions: Africa, the Americas, South-East Asia, Europe, Eastern Mediterranean and the Western Pacific. The special needs and conditions of each region are explained and are illustrated by descriptions of selected projects.

The extent and variety of the Organization's work are shown in the detailed list of some 370 projects given as Part IV of the Report and occupying over a hundred pages.

Sixteen pages of photographs give local colour and human reality to the work described in the narrative, and a number of annexes contain statistical and tabular information required by the official bodies—the World Health Assembly and the Economic and Social Council of the United Nations—to which the Report is addressed.

A COMPENDIUM OF THERAPEUTIC PREPARATIONS

The Compend. Compiled by W. Hetherington, F.P.S. Pp. 669. Bristol: John Wright & Sons Ltd. 1955.

Contents: Monographs. Approved Names. International Units and Standard Values. Guide to Monographs. Therapeutic Index. Names and Addresses, Etc., of Manufacturers and Distributors. Appendix. Index of Advertisers.

This is a useful reference book for the prescribing practitioner who is bewildered at times by the (literally) thousands of names of ethical preparations which come to his notice. The monographs, which cover 580 pages, are arranged alphabetically and reference is easy while the information given is adequate.

Long-suffering practitioners will welcome this handy reference book, which also contains a useful therapeutic guide related to proprietary preparations and much general information on the subject as indicated by the index above.

A.H.T.

JOINT FAO/WHO EXPERT COMMITTEE ON MEAT HYGIENE

Joint FAO/WHO Expert Committee on Meat Hygiene. First Report. World Health Organization: Technical Report Series 1955, No. 99, 52 pages. Price: 3s. 6d., $0.60, or Sw. fr. 2.—. Also available in French and Spanish. Local sales agent: Van Schaik's Bookstore (Pty.) Ltd., P.O. Box 724, Pretoria.

Contents: Introduction. 1. Scope of the problem. 2. Public health and economic importance. 3. The principles and objectives of meat hygiene in relation to the quality and standards required by the consumer. 4. Meatborne diseases. 5. Reporting and investigation of food poisoning. 6. The abattoir. 7. Meat inspection 8. Laboratory services in meat hygiene. 9. Laboratory methods. 10. Hygiene of meat handlers. 11. Transport of meat. 12. Sanitation of retail shops and restaurant kitchens. 13. Education and training of meat inspectors. 14. Problems requiring investigation. 15. Public support for improved meat hygiene. Annexes.

The present world scarcity of protein foodstuffs makes it necessary to conserve and utilize meat supplies to the fullest possible extent. In addition to the nutritional aspect of meat hygiene, there is a health problem; even in countries with a relatively high standard of hygiene, more than half of the outbreaks of epidemics of food-borne diseases are caused by meat, particularly processed meat.

In this report of an FAO/WHO expert committee composed of public-health experts, and veterinarians, certain fundamental principles in meat hygiene are set forth and recommendations are made which are valid for both economically developed and less-advanced countries.

Ways of improving the construction, management, and use of abattoirs are considered from the standpoint of reducing the risk of contamination and facilitating the detection of parasitic infestations and diseases of the animals. All operations which are carried out in abattoirs, including slaughtering and dressing, should be subject to control by a meat-inspection service, and the report describes the techniques of ante- and post-mortem veterinary examinations, the conditions under which these examinations should be made, and the measures to be taken with regard to carcasses displaying the pathological signs which represent the most danger from the public-health point of view.

The role of the laboratory in meat hygiene is given special attention. Laboratory tests provide the surest basis of evaluation for suspect carcasses. They make it possible to exercise continuous control of the hygienic conditions of the abattoir and of the handling of the meat after it leaves the abattoir, and they are indispensable in the investigation of cases of poisoning or of epidemics caused by food.

The compulsory notification of cases of food poisoning and the epidemiological investigations which supply public-health authorities with information concerning the pathogenic agents most frequently responsible and the foodstuffs incriminated are the subject of one section of the report. Another deals with a topic of particular interest to the directors of veterinary schools and the heads of meat inspection services: the education and professional training of inspectors, both veterinarian and non-veterinarian.

To illustrate or to give more detailed information concerning certain recommendations made by the Committee, the text of the report is followed by several annexes, in which are included plans for abattoirs, instructions concerning meat inspection, descriptions of laboratory tests, a specimen form to be used in investigations of epidemic outbreaks of food poisoning, and a selection of publications on meat hygiene.

JOINT FAO/WHO EXPERT COMMITTEE ON NUTRITION

Joint FAO/WHO Expert Committee on Nutrition. Fourth Report. Pp. 58. 3s. 6d. Geneva: World Health Organization. 1955.

Contents: 1. Introduction. 2. Programmes of FAO and WHO. 3. Requirements for Calories. 4. Requirements for Protein. 5. Protein-Rich Foods for Feeding Infants and Children. 6. Enrichment of Dried Skimmed Milk with Vitamins A and D. 7. Additives to Food. 8. Education and Training in Nutrition. 9. Pellagra. 10. Endemic Goitre. 11. Nutrition and Degenerative Diseases. 12. Anthropometry Applied to Nutrition. 13. Assessment of Nutritional Status. 14. Nutritional Aspects of the Welfare of the Aged. Annex.

Nutrition, one of the basic health problems in many countries, has been the object of considerable action on the part of two of the United Nations specialized agencies—the Food and Agriculture Organization (FAO) and the World Health Organization (WHO). In this report of the Joint FAO/WHO Expert Committee on Nutrition, a summary description of the principal nutritional needs in various parts of the world and an account of internationally aided efforts to meet these needs are given, within the framework of a review and evaluation of the relevant programmes of the two organizations.

Attention is then turned to specific problems in nutrition, among them the revision of the 1950 FAO report on calorie requirements, which has served as a guide for studies in a number of countries; the education and training of nutrition workers; anthropometry in the assessment of nutritional status; endemic goitre; food additives; and problems of diet and health, including deficiency diseases.

Protein malnutrition and its solution through the provision of greater supplies of protein-rich foods for the more vulnerable population-groups—pregnant and nursing women, infants, and children—are given particular consideration. It is suggested that there is need, in certain regions, to develop foods which utilize good sources of protein other than milk.

The enrichment of dried skimmed-milk with vitamins A and D is discussed. Milk in this form is coming into increasing use, and has been found valuable as a source of easily-assimilated animal protein in supplementary and emergency feeding programmes. However, the skimming process removes vitamin A. Provided technical difficulties can be solved, the addition of vitamins A and D to dried milk for use in nutrition programmes in areas in which deficiency of these vitamins is prevalent could do much to increase the value of this 'surplus' food.

Pellagra is another subject which is discussed. It is emphasized that the information available on pellagra needs to be assembled and published in order to call attention to the disease as a public-health problem and to stimulate research and control efforts.

Of considerable interest is a section of the report devoted to the relationship between diet and the development of degenerative diseases not generally suspected to be nutritional in origin. There is evidence to suggest, for example, that degenerative heart-disease, which is the most frequent cause of death in many countries, may be due in part to habitual diet, particularly to high-fat diets. This is a subject which warrants internationally coordinated investigation.

Another problem of increasing importance which is considered in the report is that of the addition of non-nutritive substances to food—colouring matters, flavouring and sweetening agents, preservatives, and other additives, the number of which is growing and the nature of which varies greatly from country to country. While many such substances are innocuous, others may be detri-

mental to health. International study of this problem, with the object of laying down acceptable, broad, general principles for the use of food additives, is proposed.

An annex to the report outlines methods and content of education in nutrition, which is an essential part of any effort to improve habitual diet.

EYE, EAR, NOSE AND THROAT

The Year Book of the Eye, Ear, Nose and Throat (1955-1956 *Year Book Series.*) Edited by Derrick Vail, B.A., M.D., D.Oph. (Oxon), F.A.C.S., F.R.C.S. (Hon.), and John R. Lindsay, M.D. Pp. 471. $6.50. Chicago: The Year Book Publishers, Inc. 1956.

Contents: The Eye. The Orbit and Adnexa. The Conjunctiva and Cornea. The Uvea. Refraction and Motility. The Lens and Cataract. Neurology and Visual Fields. The Retina. Glaucoma. Surgery. Therapy. Miscellaneous. The Ear. Vestibular Function and Vertigo. Hearing and Hearing Tests. Tubal Function and Inflammatory Ear Disease. Otosclerosis, Fenestration and Stapes Mobilization. Miscellaneous. The Nose and Throat. The nose and Sinuses. The Mouth Oropharynx and Nasopharynx. The Salivary Glands. The Hypopharynx, Larynx and Neck. Tracheotomy. The Trachea and Bronchi. The Esophagus. Allergy. Miscellaneous.

The latest edition of this well-known series has been produced on similar lines to past editions and contains abstracts from journals received between October 1954 and September 1955. Its perusal allows one to obtain a bird's eye view of recent work done in the western world. Condensation, of course, makes it difficult for one to grasp the technique of new procedures, such as tympanoplasty, but the scope of the work is nevertheless very wide. As is usual in a work of this kind the editors do not intrude their own views, but where occasion demands it their comments on individual abstracts are often helpful in giving the reader a more balanced impression of a particular subject.

From the otologist's viewpoint it is interesting to observe the increase in articles on mobilization of the stapes as opposed to fenestration. While there will probably always be a place for the latter operation the comparative simplicity of the first procedure makes it an attractive proposition.

The development of methods of plastic repair of defects of the middle ear has great promise and offers the possibility of permanently improved hearing to the largest group of the deaf.

An adequate index and an index to authors make this a very useful reference work indeed.

W.F. D-C.

NEUROLOGY, PSYCHIATRY AND NEURO-SURGERY

Year Book of Neurology, Psychiatry and Neuro-surgery—1955-1956 *Series.* Edited by Roland P. Mackay, M.D., S. Bernard Wortis, M.D., Percival Bailey, M.D. and Oscar Sugar, M.D. Pp. 576. $7.00. Chicago: Year Book Publishers, Inc. 1946.

Contents: Neurology: Introduction. Anatomy. Physiology. Pathology. Infectious Diseases: Meningitis. Encephalomyelitis. Poliomyelitis. Vascular Disturbances. Degenerative Diseases: Motor System Diseases. Multiple Sclerosis. Spinocerebellar Degeneration. Cerebral Palsies of Childhood. Myasthenia Gravis. The Myopathies. Miscellaneous. Metabolic Disorders. Trauma. Convulsive Disorders. Exogenous Toxins. The Neuropathies. Diagnostic and Therapeutic Methods. *Psychiatry:* Introduction. General Topics. Psychodynamic Studies. Psychosocial Medicine (Social Psychiatric Subjects), Suicide. Psychophysiologic Studies. Electroencephalographic Studies. Experimental Psychiatry. Organic Disorders, Acute and Chronic. Paroxysmal Convulsive Disorders. Schizophrenia and Affective Disorders. Miscellaneous Clinical Syndromes. Mental Deficiency. Psychosomatic Disorders and Psychoneuroses. War and Military Neuropsychiatry. Medicolegal Psychiatry. Therapy: General Problems and Evaluation of Therapy. Electroconvulsive Therapy. Insulin Therapy. Carbon Dioxide Therapy. New Drugs. Rythmic Sensory Stimulation. Neurosurgery. *Neurosurgery:* Introduction. Haemorrhage. Tumours. Lobotomy. The Hypophysis. Epilepsy. Trigeminal Neuralgia. The Sympathetic. Herniated Disks. Stereotaxy. Radioactivity. Anaesthesia. Dyskinesia. Vascular Lesions. Angiography. Hemispherectomy. Infections. Injuries. Hydrocephalus. Miscellaneous.

Each section of this book contains an introduction in which the outstanding events of the previous year in the fields of Neurology, Psychiatry and Neuro-surgery are discussed and, as far as possible put into clinical perspective; e.g. the development of an effective vaccine against acute anterior poliomyelitis, work on to so-called tranquillizing drugs, the eager study of convulsive disorders, the broadening of the field of experimental psychiatry, and a critical evaluation of the place of leukotomy in the treatment of mental disorder. The rest of the book includes short summaries of recent publications as well as a list of the more interesting recent psychiatrical and neurological publications.

Like its predecessors, this volume should be on the shelves of every practitioner in the fields of Neurology, Psychiatry and Neuro-surgery.

A.P.B.

UROLOGY

Year Book of Urology: 1955-1946 *Series.* Edited by William Wallace Scott, M.D., Ph.D., Pp. 398. Figures 82. $6·50. Chicago: The Year Book Publishers Inc. 1956.

Contents: The Tenth Congress of the International Society of Urology. General Considerations: Infections, Including Gonorrhea. Calculi. Anesthesia. Urography, Instruments and Appliances. Miscellaneous. The Kidney: Anomalies. Tumours. Trauma. Renal Failure. Nephritis and Nephrosis. Hypertension. Physiology. Transplantation. Hydronephrosis. Surgical Technic. Miscellaneous. The Adrenals: Cushing's Syndrome, Adrenogenital Syndrome and Cortical Tumours. Medullary Tumours. Adrenalectomy for Hypertension and Cancer. Miscellaneous. The Ureter: Anomalies. Calculi. Ureterointestinal. Anastomosis. Miscellaneous. The Bladder: Tumours. Micturition. Surgical Technic. Miscellaneous. The Prostate: Choice of Operation. Prostatitis. Prostatectomy. Carcinoma. The Genitalia: Penis. Urethra. Epispadias and Hypospadias. Testis Tumours. Scrotal Swellings. Cryptorchism. Fertility and Sterility. Miscellaneous.

One has come to look forward to this yearly production, and this issue is as fresh and helpful as its predecessors. The previous high standard is steadily maintained. Personally I regard the Year Book of Urology, the only one I read — as of inestimable value. It gives a concise and accurate record of urological writing extracted from all the important medical journals. The extracts are in sufficient detail to save reading the original article and all necessary illustrations are reproduced. The greatest value of the Year Book undoubtedly lies in the reputation of the editor. Here we have the skilled urologist and experienced student who sorts the wheat from the chaff and frequently provides his personal opinion in a small and valuable footnote.

This book is essentially for urologists and surgeons who do urological surgery. The complete index of both subject-matter and authors make it a valuable reference for the enquiring practitioner and student.

P.J.M.R.

ATLAS OF ANATOMY

Standard Atlas of Human Anatomy—1 Set—(Volumes I & II). By M. W. Woerdeman, M.D., D.Sc. hon. causa (Oxon.). Volume I, 512 Figures, Volume II, 642 Figures. £4 0s. 0d. Amsterdam: Butterworth & Co. (Publishers) Ltd. 1955.

Contents Volume I: Osteology (Systema Sceleti). Articulations (Iuncturae Ossium). Musculature (Systema Musculorum). Index. *Contents Volume II.* Splanchnology: Digestive System (Tractus digestivus), Peritonaeum and Spleen. Respiratory System (Tractus respiratorius), Pleurae, Thyreoid, Parathyreoid and Thymus Glands. Urogenital System (Tractus urogenitalis), Suprarenal and Mammary Glands. Angeiology: Cardiovascular System (Systema cardiovasculare) (Heart, Pericardium and Blood-vessels). Lymphatic System (Systema Lymphaticum) (Lymphatic Vessels and Lymph-nodes). Nervous System: Central Nervous System (Systema nervosum centrale), Hypophysis cerebri and Meninges. Peripheral Nervous System (Systema nervosum periphericum). Organs of Sense: The Eye (Organ visus) and Accessory Organs. The Auditory and Static Organs (Organon auditus et staticum). Gustatory Organ (Organon gustatorium.) Olfactory Organ (Organon olfactorium). Skin (Integumentum commune). Index.

The second edition was printed only for the USA and the appearance of a third only 7 years after the first indicates the general acceptance of this type of anatomical atlas. There are many excellent atlases available today, each with its own distinctive features. There are pros and cons as regards the use of highly-coloured plates, and Professor Woerdeman prefers uncoloured ones, for he believes they train the power of observation. However, he himself resorts to the use of colour in quite a number of plates. The figures are drawn from dissections, of which there are many unusual views emphasizing various relationships.

In the osteology section great attention has been paid to the fibrous structure of ligaments, fasciae and muscles and one section is devoted to illustrating the direction of action of the muscles. It is a pity that some bones used for illustration exhibit osteoarthritic changes and excessive bone deposition on the ridges normally produced at the attachment of certain muscles (e.g. plates 65 and 66).

It is gratifying to find a detailed section on the lymph glands

and ducts. A defect observed by the reviewer is that the axillary lymph glands are placed superficial to the deep fascia. The reviewer finds it difficult to understand why in an atlas of human anatomy, there appear two plates (300 and 301) showing casts of the cavities of the heart of a pig. There is no accompanying note explaining any differences from or similarities to the human heart.

The section on the nervous system appeals most to the reviewer, although generally, irrespective of the above minor criticisms, all the sections are thoroughly dealt with.

The B.N.A. nomeclature is taught in a more anglicized version in South Africa, so that the strictly Latin terminology in this atlas may appeal less to medical students here. However, as an adjunct to the study of anatomy, this atlas is well worth the price.

R.S.

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FALSE POSITIVE SEROLOGY FOR SYPHILIS AND MALNUTRITION

To the Editor: When we found 23% positive Wassermann rate in Bantu school children some years ago,[1] we were disturbed at what appeared to be a high rate for syphilitic infection in spite of the absence, in most cases, of the stigmata of the disease.

Work carried out in Central America suggests that a high incidence of positive and doubtful reactions are obtained when tests using lipoidal antigens (Kahn, Eagle, Mazzini and Hinton) are used, while the tests employing cardiolipin antigens (V.D.R.L., Kline, Rein-Bossak and Hinton cardiolipin) give a much lower reactivity and were more in agreement with the clinical findings.[2]

Depending on the tests used, it is highly probable that, in the absence of physical signs, many non-Europeans in South Africa have been diagnosed and treated as syphilitics, while they do not have the disease. This situation has no doubt led to a great deal of unnecessary expenditure.

In the course of the work at present being carried out in the Union on lipoproteins, one wonders whether it would be possible to use clinical signs and Nelson's treponemal immobilization test,[3] against a number of serological tests for syphilis. It might be possible to isolate those serum lipoprotein factors which are responsible for the false positive reactions in the serology of this condition.

The work of the Central American Nutrition Institute in Guatemala[4] was not able to relate the false positive reactors to supplementary school-feeding, treatment for intestinal parasites, serum ascorbic acid, riboflavin, alkaline phosphatase, carotene, serum albumin and globulin, and the cephalin cholesterol flocculation-test. On the other hand, statistically significantly lower serum values for vitamins A and E were found in the presumptive false positive group. The reason for this could not be determined. Perhaps the problem could be solved in South Africa.

Harding le Riche

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1. Kark, S. L. and le Riche, H. (1944): Manpower (Pretoria), **3**, 2.
2. Aragon, H. A., (1949): Organo del Ministerio de Salud Publica y Asistencia Social (Guatemala) 2 : 187.
3. Nelson, R. A. *et al.* (1950): Amer. J. Syph. Gon. Ven. Dis., **34**, 101.
4. Stout, G. *et al.* (1952): *Ibid.*, **36**, 41.

THE YOUNG AND THE OLD

To the Editor: Today in the Transvaal the jeremiad has reached the daily press, emblazoned in front-page headlines. Its author wrung his hands about us in professional circles. Now the populace at large will wring their hands and decide to 'stick to the old guard', clinging to the strong impression of respectability and altruism that they create at the bedside.

Like the Puritans of the last century who reduced their once awful and sublime theology and systematic philosophy of determinism to a set of fierce regulations and taboos, the author of this incriminating document has made the mistake of relinquishing a balanced ethical judgment for a burning revulsion against a minority of evil doers and pessimistic generalized deductions from their miscreancy.

His examples of ethical misdemeanour are all of the taboo, carnal-sin variety but with a refined and obvious ethical brush-stroke he exonerates his own contemporaries of guilt by referring to the 'growing instability in the midst of the older practitioners . . . at the presence of petty acts of spite and malice springing from a brash and ill-mannered rising generation'. One feels that the boot is, in fact, on the other foot and that a great deal of the promotive sentiment in these opinions arises from affronted personal prestige, loss of practice, and the patient's rejection of unprogressive methods—not that these are not human failings to which we all must be prone to a greater or lesser degree.

One thinks of some examples of the older practitioners. They are symbolized by an apparently fanatical adherence to unsullied etiquette on the one hand and 'broad' diagnosis and symptomatic therapy on the other; masters of the head-stroking, hand-holding art; diligent, but lacking intelligent appraisal of signs and symptoms—candidly, in fact, consummate confidence tricksters—a subtle form of spiritual sin. These are some of the old school who carp at the rising generation in any profession, like a Victorian father-capitalist whose factory slaves are not so willing any longer. One has to one's discomfiture encountered among older GPs men who have managed to escape glaring condemnation, who have the highest reputation for being gentlemen in the eyes of their old patients, who have been chairmen of ethical committees for long periods, but who defame and scandalize the name of the young practitioner called to one of his dear old patients, who consistently defraud the old dears by delayed or deceptive diagnosis while they ply the arts of liniments and analgesics, reassurance, adept tea-drinking and over-visiting (one can quote a dozen material cases in support of this restrained accusation), and then might make the sort of diatribe against the morality of the younger man that this address contained.

In joining issue with the views of the author, and taking up the cudgels for the group, one is convinced that in his thesis, based on admittedly grim facts, he has isolated his profession from world trends as a whole and exposed his colleagues to the indiscriminate judgment of the layman, who will take his evidence for gospel and universal truth. For one's own part, as a 29-year-old GP, one cannot overstate one's disgust at the frequently subtle, exclusive methods of the older generation in trying to preserve the *status quo*—this conservatism (in its worst sense) which is propelling many of the young and less well-known into what amounts at times to abuse and criminality by reason of sheer economic desperation.

In any case the medical school one trained at was established by our immediate predecessors; thus it says little for the infectivity of their ethical standards and performance if the preponderance of new doctors is falling short. It is also blatantly apparent to all lucid-thinking doctors and laymen that for every horror-fact quoted the prestige of medicine is borne aloft by three or four acts of kindness, generosity, and soul- or life-saving intervention.

None can challenge the demand for more stringent criteria for the selection of students, e.g. accepting students at an age not younger than 19 or 20. But one feels that in the professional sphere these overt glaring instances of immoral conduct, like the carnal sin, are not so destructive of morale and prestige as the more clandestine techniques, like the spiritual sin.

One would wish it made clear that one does not impugn the fine, unimpeachable record of the author. One attacks his moral and philosophical perspective, and that of his contemporaries more especially, who will hail his indictments as a further weapon in the resistance to any form of encroachment. Many of these are guilty of obsolescence in knowledge, unscrupulous financial self-preservation and a murderous stranglehold on the aspirations of their sons' contemporaries, who ask no more than liberty and opportunity within the code of ethic.

Alleged Delinquent

18 July 1956